CREATE A DEPARTMENT OF SCIENCE AND TECHNOLOGY

UNIVERSITY OF MICHIGAN
MAY 2 9 1959
MAIN READING ROOM

HEARINGS

BEFORE THE

SUBCOMMITTEE ON REORGANIZATION AND INTERNATIONAL ORGANIZATIONS

OF THE

COMMITTEE ON GOVERNMENT OPERATIONS UNITED STATES SENATE

EIGHTY-SIXTH CONGRESS

FIRST SESSION

ON

S. 676

A BILL TO CREATE A DEPARTMENT OF SCIENCE AND TECHNOLOGY, AND TO TRANSFER CERTAIN AGENCIES AND FUNCTIONS TO SUCH DEPARTMENT

AND

S. 586

A BILL TO ESTABLISH A U.S. DEPARTMENT OF SCIENCE AND TO PRESCRIBE THE FUNCTIONS THEREOF

APRIL 16 AND 17, 1959

PART 1

Printed for the use of the Committee on Government Operations

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CREATE A DEPARTMENT OF SCIENCE AND TECHNOLOGY

THURSDAY, APRIL 16, 1959

U.S. SENATE,
SUBCOMMITTEE ON REORGANIZATION AND
INTERNATIONAL ORGANIZATIONS OF THE
COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met, pursuant to call, at 10 a.m., in room 3302, New Senate Office Building, Senator Hubert H. Humphrey (chairman of the subcommittee) presiding.

Present: Senators Humphrey, Muskie, and Gruening.

Also present: Walter L. Reynolds, chief clerk and staff director; Ann M. Grickis, assistant chief clerk; and Arthur A. Sharp, professional staff member.

Senator HUMPHREY. We shall open the hearing on S. 676, to create a Department of Science and Technology. These hearings are held primarily to review and make available to the Congress, the executive branch of the Government, and to the scientific community information which we believe would be helpful in the formulation of a program for the reorganization of Federal scientific activities.

The bill now under consideration, S. 676, was originally proposed by the Committee on Government Operations in the 85th Congress as title I of the proposed Science and Technology Act of 1958, S. 3126. It would provide for the creation of a Department of Science and Technology, and would transfer certain agencies and functions relating to science and technology to such a department.

A number of hearings were held on certain aspects of the original proposal, and some revisions were made in the bill now pending before the subcommittee.

The main objective of the committee in conducting these hearings is to place emphasis upon the need to effect necessary and desirable reorganizations within the Federal Government structure which relate directly to Federal scientific activities, and to promote better centralization and coordination of Federal science programs and operations.

I do believe that the hearings last year resulted in some improvement, as outlined in progress reports field in the Senate by the subcommittee—Senate Report 2498, 85th Congress, and Senate Report 120, 86th Congress.

The bill under consideration should be considered merely as an approach to the problems involved, and does not represent any final conclusions of this committee. The committee hopes through these hearings to develop testimony which will lead to the approval of leg-

islation which would promote more efficiency in governmental science activities and develop the proper framework under which science and technology can be molded to the greatest common good.

As pointed out in the committee's report to the present Congress on the need of improvement of these Federal functions—Senate Report 120—there have been a number of objections made which have some direct application to the creation of a Department of Science. Some of these recommendations which are set forth in the report have particular merit, and certainly should be given careful consideration both by the Congress and Federal officials concerned with these programs.

The bill under consideration must therefore be viewed merely as an approach to the problem. And, as the main author of that bill, may I say that we do not claim that it is perfect, or that it even meets what many of our witnesses will feel is desirable in terms of objectives. But we had to have something to start with, and this is the result of considerable staff study and committee hearings.

I wish to emphasize, on behalf of the committee, that although S. 676 was introduced under the sponsorship of members of this committee, none of them is committed to any particular organizational structure which should be incorporated into such a department. It is hoped that these hearings will develop additional suggestions and recommendations which will enable this committee, or some other committee of the Congress which might have more direct supervision over science activities, to bring about improvement and better coordination of science functions within the Federal Government.

The committee extends an invitation to others who may be interested, particularly members of the scientific community and the constituent agencies which are now administering science programs within the Federal Government, to submit statements and recommendations which they may feel would tend to effect the necessary cohesiveness and coordination of Federal science activities which are considered to be necessary to meet the essential requirements of Government in the fulfillment of its obligation to the American people.

I shall insert in the record at this point a copy of the bill, S. 676, and a related measure, S. 586, introduced by Senator Estes Kefauver, which is also pending before the committee.

(The bills referred to follow:)

[S. 676, 86th Cong., 1st sess.]

A BILL To create a Department of Science and Technology, and to transfer certain agencies and functions to such Department

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE

SECTION 1. This Act may be cited as the "Department of Science and Technology Act of 1959".

ESTABLISHMENT OF DEPARTMENT

SEC. 2. There is hereby established an executive department of the Government to be known as the United States Department of Science and Technology (hereinafter referred to as the "Department"), at the head of which shall be a Secretary of Science and Technology (hereinafter referred to as the "Secretary"),

who shall be appointed by the President, by and with the advice and consent of the Senate, and shall receive compensation at the rate provided by law for heads of the executive departments.

UNDER SECRETARY AND ASSISTANT SECRETARIES

SEC. 3. There shall be in the Department an Under Secretary of Science and Technology, such Assistant Secretaries as shall be determined by the President to be necessary, and a General Counsel, each of whom shall be appointed by the President, by and with the advice and consent of the Senate, shall perform such functions and duties as the Secretary may prescribed, and shall receive compensation at the rate provided by law for under secretaries (other than the Under Secretary of the Department of State), assistant secretaries, and general counsels, respectively, of the executive departments. The Under Secretary (or, during the absence or disability of the Under Secretary, or in the event of a vacancy in the Office of the Under Secretary, an Assistant Secretary determined according to such order as the Secretary shall prescribe) shall act as Secretary during the absence or disability of the Secretary or in the event of a vacancy in the Office of Secretary.

PROVISIONS OF LAW APPLICABLE TO THE DEPARTMENT

SEC. 4. Except to the extent inconsistent with this Act, all provisions of law applicable to the executive departments generally shall apply to the Department.

SEAL

SEC. 5. The Secretary shall cause a seal of office to be made for the Department, of such design as the President shall approve, and judicial notice shall be taken thereof.

DELEGATION OF AUTHORITY

SEC. 6. The Secretary may, without being relieved of his responsibility therefor, and unless prohibited by some specific provision of law, perform any function vested in him through or with the aid of such officials or organizational entities of the Department as he may designate.

NATIONAL SCIENCE FOUNDATION

SEC. 7. The National Science Foundation, together with its personnel, property, records, obligations, commitments, and the unexpended balances of its appropriations, is transferred to the Department where it shall exercise its functions subject to the supervision and direction of the Secretary.

ATOMIC ENERGY COMMISSION

SEC. 8. The Atomic Energy Commission, together with its personnel, property, records, obligations, commitments, and the unexpended balances of its appropriations, is transferred to the Department where it shall exercise its functions subject to the supervision and direction of the Secretary and shall be known as the Atomic Energy Administration of the Department of Science and Technology.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SEC. 9. The National Aeronautics and Space Administration, together with its personnel, property, records, obligations, commitments, and the unexpended balances of its appropriations, is transferred to the Department where it shall exercise its functions subject to the supervision and direction of the Secretary.

NATIONAL BUREAU OF STANDARDS

SEC. 10. (a) The National Bureau of Standards in the Department of Commerce, together with such personnel, property, records, obligations, commitments, and unexpended balances of appropriations, allocations, and other funds as are determined by the Director of the Bureau of the Budget to be used primarily with respect to functions being administered through such Bureau, is transferred to the Department, and all functions of the Secretary of Commerce being administered through such Bureau are transferred to the Secretary.

(b) The Secretary shall establish a component of the Department separate from the National Bureau of Standards through which he shall administer the functions being carried out through the radio and cryogenic laboratories at Boulder, Colorado.

TRANSFERS FROM SMITHSONIAN INSTITUTION

SEC. 11. (a) The following functions of the Smithsonian Institution are transferred to the Secretary:

(1) All functions being administered through the Division of Astrophysical Research;

(2) All functions being administered through the Division of Radiation and Organisms;

(3) All functions transferred to such Institution under the provisions of part VIII of Reorganization Plan Numbered 3 of 1946 (relating to the Canal Zone Biological Area);

(4) All functions with respect to the exchange of scientific publications being administered through the International Exchange Service; and

(5) Any other functions of such Institution which are determined by the Director of the Bureau of the Budget to relate primarily to scientific research not related to museum or zoological purposes.

(b) All personnel, property, records, obligations, commitments, and unexpended balances of appropriations, allocations, and other funds, which the Director of the Bureau of the Budget determines are used primarily in relation to any function transferred under the provisions of this section, are transferred to the Department.

(c) Nothing in this section shall be deemed to authorize any transfer which in the opinion of the Attorney General cannot be made because of the provisions of a private bequest or other grant to such Institution.

TRANSFER MATTERS

SEC. 12. All laws relating to any agency or function transferred under this Act shall, insofar as such laws are not inapplicable, remain in full force and effect. Any transfer of personnel pursuant to this Act shall be without change in classification or compensation, except that this requirement shall not operate to prevent the adjustment of classification or compensation to conform to the duties to which such transferred personnel may be assigned. All orders, rules, regulations, permits, or other privileges made, issued, or granted by any agency or in connection with any functions transferred by this Act, and in effect at the time of the transfer, shall continue in effect to the same extent as if such transfer had not occurred, until modified, superseded, or repealed. No suit, action, or other proceeding lawfully commenced by or against any agency or any officer of the United States acting in his official capacity shall abate by reason of any transfer made pursuant to this Act, but the court, on motion or supplemental petition filed at any time within twelve months after such transfer takes effect, showing a necessity for a survival of such suit, action, or other proceeding to obtain a settlement of the questions involved, may allow the same to be maintained by or against the appropriate agency or officer of the United States.

EXPENDITURES AUTHORIZED

SEC. 13. The Secretary is authorized to make such expenditures (including expenditures for personal services and rent at the seat of government and elsewhere, for lawbooks, books of reference and periodicals, and for printing and binding) as may be necessary to carry out the provisions of this Act, and as may be provided for by the Congress from time to time.

REPORTS TO CONGRESS

SEC. 14. The Secretary shall make at the close of each fiscal year a report in writing to Congress giving an account of all moneys received and disbursed by him and the Department, describing the work done by the Department, and making such recommendations as he shall deem necessary for the effective performance of the duties and purposes of the Department.

AMENDMENT

SEC. 15. Section 158 of the Revised Statutes of the United States, as amended (5 U.S.C. 1), is amended by inserting at the end thereof the following: "Eleventh: The Department of Science and Technology."

APPROPRIATIONS AUTHORIZED

SEC. 16. There are authorized to be appropriated such sums as may be necessary to enable the Department to carry out the provisions of this Act and to perform any other duties which may be imposed upon it by law.

EFFECTIVE DATE

SEC. 17. The provisions of this Act shall be effective on its date of enactment, except that sections 7 through 11 shall be effective after ninety days following such date.

[S. 586, 86th Cong., 1st sess.]

A BILL To establish a United States Department of Science and to prescribe the functions thereof

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE

SECTION 1. This Act may be cited as the "Department of Science Act of 1959".

ESTABLISHMENT OF DEPARTMENT

SEC. 2. There is hereby established an executive department of the Government to be known as the United States Department of Science (hereinafter referred to as the "Department"), at the head of which shall be a Secretary of Science (hereinafter referred to as the "Secretary"), who shall be appointed by the President, by and with the advice and consent of the Senate, and shall receive compensation at the rate provided by law for heads of the executive departments.

UNDER SECRETARY AND ASSISTANT SECRETARIES

SEC. 3. There shall be in the Department an Under Secretary of Science, such Assistant Secretaries as shall be determined by the President to be necessary, and a General Counsel, each of whom shall be appointed by the President, by and with the advice and consent of the Senate, shall perform such functions and duties as the Secretary may prescribe, and shall receive compensation at the rate provided by law for under secretaries (other than the Under Secretary of the Department of State), assistant secretaries, and general counsels, respectively, of the executive departments. The Under Secretary (or, during the absence or disability of the Under Secretary, or in the event of a vacancy in the office of the Under Secretary, an Assistant Secretary determined according to such order as the Secretary shall prescribe) shall act as Secretary during the absence or disability of the Secretary or in the event of a vacancy in the office of Secretary.

FUNCTIONS OF SECRETARY

SEC. 4. The Secretary is authorized to establish and carry out (1) such programs for developing missiles, rockets, and other means of conveyance to, and carrying on research in, outer space, and (2) such programs of research with respect to outer space, as he may determine to be in the national interest.

TRANSFERS FROM DEPARTMENT OF DEFENSE

SEC. 5. (a) There are transferred to the Secretary such functions of the Secretary of Defense and the Secretaries of the military departments of the Department of Defense as the President determines to relate primarily to the development of missiles and rockets not intended as weapons and to research into the problems of outer space.

(b) All personnel, property, records, obligations, commitments, and unexpended balances of appropriations, allocations, and other funds, which the Director of the Bureau of the Budget determines are used primarily in relation to any function transferred under the provisions of this section, are transferred to the Department.

NATIONAL SCIENCE FOUNDATION

SEC. 6. The National Science Foundation, together with its personnel, property, records, obligations, commitments, and the unexpended balances of its appropriations, is transferred to the Department where it shall exercise its functions subject to the supervision and direction of the Secretary.

ATOMIC ENERGY COMMISSION

SEC. 7. The Atomic Energy Commission, together with its personnel, property, records, obligations, commitments, and the unexpended balances of its appropriations, is transferred to the Department where it shall exercise its functions subject to the supervision and direction of the Secretary.

TRANSFER MATTERS

SEC. 8. All laws relating to any agency or function transferred under this Act shall, insofar as such laws are not inapplicable, remains in full force and effect. Any transfer of personnel pursuant to this Act shall be without change in classification or compensation, except that this requirement shall not operate to prevent the adjustment of classification or compensation to conform to the duties to which such transferred personnel may be assigned. All orders, rules, regulations, permits, or other privileges made, issued, or granted by any agency or in connection with any functions transferred by this Act, and in effect at the time of transfer, shall continue in effect to the same extent as if such transfer had not occurred, until modified, superseded, or repealed. No suit, action, or other proceeding lawfully commenced by or against any agency or any officer of the United States acting in his official capacity shall abate by reason of any transfer made pursuant to this Act, but the court on motion or supplemental petition filed at any time within twelve months after such transfer takes effect, showing a necessity for a survival of such suit, action, or other proceeding to obtain settlement of the questions involved, may allow the same to be maintained by or against the appropriate agency or officer of the United States.

ADVISORY COMMITTEES

SEC. 9. The Secretary may establish such advisory committees on science as he may determine to be desirable and in futherance of the purposes of this Act. The members of any such committee shall be reimbursed for actual travel and subsistance expenses incurred in attending meetings of the committee.

PROVISIONS OF LAW APPLICABLE TO THE DEPARTMENT

SEC. 10. Except to the extent inconsistent with this Act, all provisions of law applicable to the executive departments generally shall apply to the Department.

SEAL

SEC. 11. The Secretary shall cause a seal of office to be made for the Department, of such design as the President shall approve, and judicial notice shall be taken thereof.

DELEGATION OF AUTHORITY

SEC. 12. The Secretary may, without being relieved of his responsibility therefor, and unless prohibited by some specific provision of law, perform any function vested in him through or with the aid of such officials or organizational entities of the Department as he may designate.

EXPENDITURES AUTHORIZED

SEC. 13. The Secretary is authorized to make such expenditures (including expenditures for personal services and rent at the seat of government and elsewhere, for lawbooks, books of reference and periodicals, and for printing and

binding) as may be necessary to carry out the provisions of this Act, and as may be provided for by the Congress from time to time.

REPORTS TO CONGRESS

SEC. 14. The Secretary shall make at the close of each fiscal year a report in writing to Congress giving an account of all moneys received and disubrsed by him and the Department, describing the work done by the Department, and making such recommendations as he shall deem necessary for the effective performance of the duties and purposes of the Department.

AMENDMENTS OF REVISED STATUTES

SEC. 15. Section 158 of the Revised Statutes of the United States, as amended (5 U.S.C. 1), is amended by inserting at the end thereof the following:
"Eleventh: The Department of Science."

APPROPRIATIONS AUTHORIZED

SEC. 16. There are authorized to be appropriated such sums as may be necessary to enable the Department to carry out the provisions of this Act and to perform any other duties which may be imposed upon it by law.

EFFECTIVE DATE

SEC. 17. The provisions of this Act shall be effective on the date of enactment except that sections 5, 6, 7, and 8 shall be effective after ninety days following such date of enactment.

Senator HUMPHREY. It has been the view of the chairman of this subcommittee, at least, that the information to be developed through these hearings is needed in order to provide a base for the Congress or the President to take some positive and effective action in the broad range of Federal science activities and to eliminate the present lack of coordination of those activities. The hearings that we will conduct now and have conducted in the past will be and have been directed toward that purpose. We feel that they can be helpful in formulating a satisfactory and effective program for the reorganization of the science functions of the Government.

The first witness this morning is Mr. Enoch R. Needles, president of Engineers Joint Council. He is accompanied by Dr. Augustus B. Kinzel, vice president, Engineers Joint Council, and Mr. L. K. Wheelock, executive secretary, Engineering Manpower Commission.

Please come forward and be seated.

STATEMENT OF ENOCH R. NEEDLES, PRESIDENT, ENGINEERS JOINT COUNCIL; ACCOMPANIED BY AUGUSTUS B. KINZEL, VICE PRESIDENT, ENGINEERS JOINT COUNCIL, AND L. K. WHEELOCK, EXECUTIVE SECRETARY, ENGINEERING MANPOWER COMMISSION

Senator HUMPHREY. Mr. Needles, you may proceed.

Mr. NEEDLES. Mr. Chairman and committee members, my name is Enoch R. Needles. As a consulting engineer, I am senior partner of a nationally known firm of consulting engineers. I am a civil engineer practicing my profession almost wholly in the field of public works, principally bridges and expressways. I am past president of the American Society of Civil Engineers, American Institute of Consulting Engineers, American Road Builders Association, and consultant to various State turnpike authorities. And I only wish that

Senator Muskie were here to listen to me when I state that we are identified with the Maine Turnpike.

Senator GRUENING. I think Senator Muskie is on his way.

Mr. NEEDLES. I am privileged to appear before you as president of Engineers Joint Council, and I am accompanied by our vice president, Dr. Augustus Kinzel. Dr. Kinzel is both a metallurgical engineer and a scientist, and past president of the American Institute of Mining, Metallurgical, and Petroleum Engineers. His professional practice is concerned with directing integrated engineering and scientific research in an industrial corporation; he has served as consultant to the Atomic Energy Commission and the War Production Board, and serves on the Naval Research Advisory Committee, the Defense Science Board of the Department of Defense, and others.

We are indeed pleased to respond to your invitation to present a statement on behalf of Engineers Joint Council. The council is a nongovernment, nonprofit federation of 20 societies of professional engineers. The 300,000 aggregate membership of these societies include engineers in every major engineering specialty, employed in the manifold functions and activities of the profession in industry, government, and education. We are privileged to represent the societies in matters that are of common concern to the entire profession, such as in the present instance—recommending public policies wherein engineering can contribute to the general welfare of mankind.

Mr. Chairman, Engineers Joint Council supports in principle the creation of a Cabinet-level Department for Science and Enginering, basically at the administrative level, the better to serve our national economy and our national defense, but we would emphasize that science and engineering, directly pertinent to the missions of certain departments, must continue to be carried out within these departments.

We strongly urge that any administrative development in this field be properly identified as "science and engineering," not only as a matter of recognition but as a matter of clearly setting forth the intent of the measures to include the field of engineering activities. Our recommendation has far broader implications than one based on concern for semantics. We believe it is very important that proper balance of these elements of Government planning and action be maintained and be emphasized by specific reference to the roles played by each.

We fear that much of the planning in Government has failed to properly consider this implication, and we take exception to the undue emphasis on "science," even when used in a broad sense. Although the intention may be to include engineering, this is only apparent to those using the word and not to their audiences.

The engineering profession has established—through its Engineers' Council for Professional Development—the following definition:

Engineering is a profession in which a knowledge of mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize economically the materials and forces of nature for the progressive well-being of man.

"Technology" on the other hand, is widely used, but mostly misused. Webster defines "technology" as "industrial science; the science or systematic knowledge of industrial arts." As such, it is a re-

strictive word, which surely does not properly include the full dimensions of engineering, and we deplore the trend to use "technology" as a substitute for engineering.

Since science provides us the basic knowledge and the laws of our environment, and engineering furnishes the means by which this knowledge is made useful to mankind, it is self-evident that the two words provide the full scope intended. Technology is a woefully inadequate word to represent either or both elements.

The engineering profession today is one of the largest professional groups in the United States with over three-quarters of a million members. In partnership with their 300,000 scientific brethren, engineers have provided the means to achieve many of the great technical advances of our age, including space exploration and nuclear power development. We feel that recognition by Congress and other Government branches of the identifiable element of engineering as well as science is an urgent important request. This will serve to make clear that the intent of Congress is to include, by specific reference, engineering matters. Only "science and engineering" fully represent the entire spectrum of the technical society, with which we are certain you are concerned.

I should like to interpolate for a moment the additional thought that, in the eyes of the public or in the understanding of the public, reference to "science" and "technology" must be very vague indeed. In fact, I doubt if any of us fully understand what is meant by "science" and "technology." We do know and the public knows what is meant by "science" and "engineering."

In order to differentiate between "science" and "engineering," I think it is wise to think of the automobile as we have it today and the place it has obtained in our motorized economy. The basic idea of the internal combustion motor goes back to science, we might say. But the development of that idea and of putting it into effect and giving us the automobiles and the trucks that we have today is truly a part of engineering, and the differentiation is very, very clear.

It might be called to your attention that when a certain moonshot failed some time back, reference was made to the fact that it was a 90 percent scientific success. The inference was that it was either a 10 percent engineering success or a 90 percent engineering failure. You can take your choice, but it was certainly science and engineering that were involved.

There may be those who say, "Well, technology is a common word," and think of our great Massachusetts Institute of Technology. I would agree that it is not only a very notable institution and does a magnificent work, but I call to your attention that it produces eminent scientists and eminent engineers, and it does not produce technologists. There is no such thing that I know of as a degree in technology.

For these very simple and definite reasons, we hope that it will be clear to you that a service to the public will be performed if the word "engineering" is substituted for "technology."

As I stated earlier, we favor in principle the creation of a high level instrumentality of the Federal Government that would not only be fully responsive to the increasing demands of Government planning and programing in the sciences and in engineering, but have both the responsibility and authority for its implementation.

Our administrative approach to and procedures in programs of science and engineering, urgently requires systematic leadership coupled with authority to cope with the ever-changing needs in these areas.

Advancements in the sciences and in engineering have placed new demands on our institutions of higher learning, on industry, and on Government. The scope of these developments has necessitated increased Government participation in many areas bearing directly on science and engineering. In spite of the growth of Government programing, administrative procedures as now in existence have failed to bring about the balanced progress in depth and breadth that we have needed as fast as this could have been done with more overall line authority. It is imperative, for the long range situation, that we have responsible leadership with authority at the Cabinet level in order to bring about the development of a fully integrated program.

Activities in science and engineering have increased greatly in the past few years with the growth of our economy and with the requirements for national security. They include, among others, conduct and/or support of research and development; expansion of research facilities, testing, evaluation, and standardization; training of scientific and engineering manpower; dissemination of scientific and engineering information and statistics; operational programs in many fields such as nuclear power development, space exploration, weather control, mineral resources development, and civil works such as reclamation projects, flood control, disposal of wastes, construction of dams, highways, bridges, waterways, harbors, and irrigation works.

In the absence of overall concern, coupled with authority, for the effective direction of our efforts in these fields, it is apparent that duplicative programing will occur in some areas while other significant needs will be neglected. Your committee has devoted considerable fruitful time to the study of the problem of dissemination of scientific and engineering information. We believe that the results of this study are a good example of our point. Although many organizations in Government are involved in the collection and dissemination of such information, there was no coordinated authoritative effort to avoid duplication and insure adequate coverage in many areas. This was recognized in the establishment of the Scientific Information Service within the National Science Foundation. Unfortunately, the identification of this need and its remedial measure were only accomplished after extensive hearings and at the legislative direction of Congress in the National Defense Education Act of 1958.

Another problem deserving more systematic and coordinated appraisal of the Federal Government concerns the development, training, and utilization of scientific and engineering brainpower, which is of vital importance to our national welfare. At present, the appraisal of this resource comes under the province of many different Government agencies, the National Science Foundation, the Office of Civil and Defense Mobilization, the Bureau of Labor Statistics, the Atomic Energy Commission, the Civil Service Commission, and others. The determination of the proper role of the Federal Government with respect to the Nation's scientific and engineering man-

power problems and program needs within the Government itself are subject to the evaluations of many agencies at various levels of responsibility with differing emphasis and objectives. There is no coordinated approach to the problem and apparently no responsibility for such coordination at the higher administrative levels of the Federal Government. The President's Committee on Engineers and Scientists, on which I was privileged to serve, in its final report to the President in December 1958 recommended that—

> The Federal Government, at the White House level, assume responsibility for coordinating and stimulating the Nation's efforts in the development and utilization of highly trained manpower.

We believe that a continuing evaluation of engineering and scientific manpower resources and requirements in relation to our national economy is vitally needed. This can be accomplished through the mechanism of a centralized and recognized authoritative agency such as a Department of Science and Engineering.

Under the current diversity of organizational effort, there is real danger that important areas of new knowledge will not receive the attention and research support they merit. We are speaking, of course, of those areas in which integrated planning by the Government is required because of the enormous scope of the problem and because it represents the welding of many joint intellectual efforts. A notable example of one neglect has been in the field of oceanography as reported recently by a committee of the National Academy of Sciences. The identification and assessment of our needs in such broad areas together with implementation of the conclusions, cannot be rapidly achieved by the sum of various segments scattered through Government but rather through an integrated analysis of our entire resources and efforts in science and engineering coupled with the authority to implement the findings.

In short, we believe that the responsibility for fundamental engineering must reside in one department. We believe that the establishment of a Department of Science and Engineering would provide a suitable mechanism for the coordination and consolidation of certain elements now carried out in Government and would provide a centralized collation of basic information concerning our total effort which is vital to Congress in evaluating legislative needs as well as budgetary requirements for our national welfare.

The organization and implementation of a major Government structure such as this obviously requires careful study and sound judgments. We recommend that particular care be exercised in the transitional phases of reorganization which would accompany the creation of this proposed new department.

It must be recognized that many research and other scientific and engineering functions are now fully integrated in certain Federal departments and are essential complements to the objectives of the departments. Such programs could not and should not be logically administered under a separate agency. They should remain as proper functions to be discharged by their parent organizations. It is important to emphasize that, even though a Department of Science and Engineering be created, certain science and engineering efforts must continue in other departments of the Federal Government such

as the Departments of Defense, Health, Education, and Welfare, Agriculture, and the like.

The new department should, however, bring together the activities of a broad engineering and scientific nature not directly pertinent to the missions of the other departments and should, in addition, coordinate science and engineering in such departments by some device such as the Federal Council for Science and Technology recently established, in order to insure the development of balanced programs, prevent dissipation of efforts, and insure the preservation of our excellence in the fundamental areas of science and engineering.

Science and engineering as a vital force can provide us with the means of achieving continued progress in the years ahead. These elements by their stature and dimensions now deserve recognition and prestige at the highest levels of Government by providing a unified responsive, responsible, and authoritative body within the executive branch of the Federal Government. Furthermore such an agency would provide the means to more effectively communicate with Congress and to more effectively respond to congressional interests in all broad matters in science and engineering. We therefore support the concept of a Department of Science and Engineering.

Mr. Chairman, we wish to express our appreciation for the opportunity of presenting our recommendations on this important matter. Because of time limitations and the magnitude of this whole problem, our comments have been of a very general nature. As your committee develops the final wording of the legislation and decides upon the arrangement for the functioning of this new Department of Science and Engineering, you may determine that a national advisory board of engineers may prove of value to the Department in reviewing, studying, and reporting upon specific problems having engineering features. In the manning and implementation of this advisory board, you may be sure that Engineers Joint Council will be prepared to render full assistance in providing and maintaining qualified personnel for service on this board. These engineers will be the best this Nation has to offer, men whose background, experience, and authoritative works will assure public confidence. Dr. Kinzel and I would be pleased to comment further, if you so desire. On behalf of Engineers Joint Council, I am pleased to offer our services in any way that we may assist your committee. Thank you.

Senator HUMPHREY. Thank you very much, Mr. Needles.

The proposal which you have made at the conclusion of your remarks seems to be very meritorious. These advisory councils and boards to established agencies can be very helpful, particularly in the professional fields. And I am sure that we welcome the suggestion.

Senator Gruening, do you have any questions that you want to ask Mr. Needles?

Senator GRUENING. I was very much interested in Mr. Needles' excellent statement, and impressed by his great emphasis on the need of separating engineering from science and calling this agency, which I hope will be created, the Department of Science and Engineering.

I am sure that you are aware that we have a number of agencies in the Government now which devote themselves to engineering, such as the Corps of Engineers and the Bureau of Reclamation. Do you

not feel there would be some conflict there if we attempt to center engineering functions as such in the Department of Science? My conception of the Department of Science is that it would be an overall agency that would of course include such engineering as is related to various sciences.

Mr. NEEDLES. Sir, I should like to make it very clear that we do know about those departments, those bureaus and agencies in the different departments. In fact, I was in the Corps of Engineers in World War II; I was in the Chief's office for 3 years. I know what the different departments of engineering are, how they function and what they serve. There is no thought that there would be a replacement of those agencies by this overall Department of Science and Engineering. The thought is that this Department could function best at the administrative level, avoiding duplication, assuring cooperation, and consolidating the efforts of these different agencies within the different departments to secure the best results.

And I should like to ask Dr. Kinzel to supplement these remarks at this time.

Senator HUMPHREY. Dr. Kinzel, will you go right ahead?

Dr. KINZEL. Thank you.

First, you mentioned the separation of science and engineering. I want to emphasize that the whole point is not the separation but the integration. And this is why in a central department we would have science and engineering as here suggested.

The other questions touched directly on the rule of controversial phases of this bill. As far as I have been able to determine, talking with a great many of my colleagues both in science and engineering, they practically all subscribe to the principle. The problem is, how is it to be implemented; namely, which agencies which are now in no department whatever and which of the bureaus or subgroups in other departments such as Commerce, Agriculture, and the like, which of these shall be incorporated in the new Department of Science and Engineering?

This is an extremely complex problem. It is fraught with human factors as well as factors involved in the science and engineering phases of things. And I doubt that simply getting opinions of people in the area is an efficient approach to the solution of this problem.

Now, we are talking about a Department of Science and Engineering, and I would venture to suggest that the way to go at this is to use the methods of science and engineering; namely, get all the facts.

In the reorganization of Government, this is difficult, it takes time in order to get the details which are necessary. I would suggest that perhaps something paralleling the Hoover Commission, something of that nature but directed specifically to this problem, is very much in order. Such a group could work with the executive branch in coming to a conclusion as to which of the present agencies and which of the present functions within existing departments should be transferred to the new Department.

Finally, I would emphasize the extreme urgent need to maintain research and development within the existing departments as that research and development pertains to their mission. And this goes for basic research as well as for development work.

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In the case of basic research, it is essential that within a given group there be enough basic research so that the people there understand what is going on in the world of basic research as it pertains to them. We in the research profession have come to call this the coupling effect. You cannot learn what other people are doing in such a way as to know how to put it to use for your own purpose in any given department, for example, really effectively unless you yourself are actually operating in the area and are knowledgeable in a very current way.

So we support the bill, but urge that the detail and the composition of the new Department be a matter for intensive study, further study.

Thank you.

Senator HUMPHREY. Senator Gruening.

Senator GRUENING. Dr. Kinzel, I want to revert to the question in my mind previously addressed to Mr. Needles. Engineering is the application of science in a number of fields, but science certainly includes a number of important fields in which engineering plays a negligible part or a secondary part.

I am thinking, for instance, of such agencies of Government as those dealing with entomology in the Department of Agriculture; with plant quarantine in the Department of Agriculture; the Fish and Wildlife Service, which has to do with the conservation of animal species; certain aspects of forestry.

Now, in the Department of Health, Education, and Welfare there are many departments dealing with preventive medicine, sanitation, and so forth, in which engineering may appear. Science has a much broader definition. And I am fearful that if you include engineering in this title you seem to exclude many areas of scientific importance in which engineering plays a lesser part. Of course, wherever you use "engineering," there must be a background of science to begin with. Nearly all inventions have their origin in abstract research, and then their application by engineering. It seems to me implicit that engineering is going to play a very important part in the application of science. Science seems to me a much more inclusive term. I think you limit its scope when you want this to be called a Department of Science and Engineering.

Dr. KINZEL. Actually, the argument here presented had to do not with elimination of the word "science" at all, but rather with the substitution and the proper substitution of the word "engineering" for the word "technology."

Now, when we say "science and technology" we are saying one thing. What we are proposing is that you call this "science and engineering."

I note one of the illustrations which you just gave failed to be encompassed by the two. Actually, for any scientific development to become useful to mankind, engineering of one sort or another must and always is applied. Surgery, for example, is an illustration why one would think offhand that engineering played little role. And yet the surgeons and research people in medicine use the engineers and with the help of the mechanical people in large measure in order to perfect their operations.

Senator GRUENING. May I interrupt to ask a question?

Dr. KINZEL. Please do.

Senator GRUENING. Pertinent to your remarks, how does engineering fit into the science of game management, for instance?

Dr. KINZEL. Well, what I said was that science and engineering together cover the field. Game management has to be predicated on certain facts regarding the laws of nature and the behavior of nature. The facts are accumulated and discovered by means of scientific work. And the minute we use these facts to divert streams or to conserve land, things of that kind, you are applying engineering. If you simply use the fact to pass laws with respect to the time and place at which animals may be hunted and fished and so on, you are not applying engineering, we are using the scientific facts directly to accomplish your purpose through legislative means. But again I think that what we have been saying, sir, simply emphasizes the fact that science and engineering together are what we need to cover the situation.

Mr. NEEDLES. May I supplement Dr. Kinzel's remarks, to the effect that the word we are bothered about is "technology" not "science." To those of us in the engineering profession who have to work shoulder to shoulder with and thoroughly understand the activities and developments of the scientists, we can best, I believe, illustrate our relationship by reference to the Manhattan project which produced actual atomic fission for use. The idea, the theory and development of nuclear fission on the part of the scientists was a very positive development, but in order to put that idea into effect required the expenditure of not just millions of dollars, but hundreds of millions of dollars and engineering effort and endeavor in order to make it a feasible, workable thing. It was a perfect illustration of the wedding of science and engineering.

Senator GRUENING. Would it meet your objection then, if the bill were entitled merely "to create a Department of Science," and leave out the word "technology," if your objection is chiefly toward the word "technology," and you desire to substitute engineering for technology, would that meet your objection?

Mr. NEEDLES. No. I think that your conception of having a new department to administer the overall picture and deal with the field in which science and engineering are coupled together to do the things that are being done, that is a very fine conception. But, Mr. Chairman, you had stepped out of the hearing room for a moment when I interpolated remarks here to the effect that, in addition to the written statement, one reason that we believe that the term "science and engineering" would be better than "science and technology" is that this thing of the combination of science and technology presents a very vague picture, not only in the minds of the public, but in the minds of those of us who are closest to the picture. It is very, very difficult to say what technology is. As I pointed out, the Massachusetts Institute of Technology produces both scientists and engineers, but they do not produce technologists. There is no degree in technology. But the public does know what science and engineering is, and I think that the thinking public also understands that what our Nation has accomplished has been due to the very proper and very effective wedding and cooperative effort of both science and engineering. I think that——

Dr. KINZEL. I should like to add to that that the use of the word "science" only would leave out an enormous area and would certainly lead to great confusion in the interpretation of what is meant.

Senator HUMPHREY. Thank you very much, Dr. Kinzel.

Senator Muskie?

Senator MUSKIE. Mr. Needles and Dr. Kinzel, you have raised the interesting and pertinent question as to what programs now existing in various departments of the Government should be brought under the umbrella of the Department of Science and Technology. I wondered what relationship there might be between that observation on your part and the actual proposals of the bill. The bill proposes to bring into the Department the National Science Foundation, the Atomic Energy Commission, the National Aeronautics and Space Administration, the National Bureau of Standards, and certain functions of the Smithsonian Institution.

Would it be your judgment that these particular activities ought to be included in the proposed Department?

Mr. NEEDLES. Senator, if I may, I should like to point out that as president of Engineers Joint Council, I can speak very positively on matters of general import with respect to engineers in particular. Our engineering society represents all engineers, the whole Nation over, and in all the different departments of Government, in all different departments of industry, and in all the rest of it. And I truly have not given either personal thought, nor have we had intensive thought on the part of council to this question of which agencies should be in this Department. I believe as we have tried to emphasize here that that should be the result of further intensive study excepting the fact that there should be an overall administrative Department dealing with these matters. And I should like for Dr. Kinzel to supplement that statement.

Dr. KINZEL. This was the tenor of my remarks, that I think a Commission to study this is very much in order. Obviously, for reasons that you understand much better than I do, no one agency will want to be transferred from where it is in all probability, no present agency which is independent will want to come under the umbrellas or come under this Department of their own volition, again in all probability, human nature being what it is.

Senator MUSKIE. You gentlemen would not support immediate passage of the bill in its present form, then, but you would support its general objectives?

Dr. KINZEL. That is correct.

Senator MUSKIE. As we search for guidelines, in your statement, Mr. Needles, you stated that activities not directly pertinent to the missions of the other departments might well be included in the proposed new Department. And that is a fine general statement, but then you get into the problem of defining what is pertinent to the missions of other departments. You have already suggested that some activities in the field of research and development should be retained in existing departments.

At another point in your testimony, Mr. Needles, you undertook to define the scope of present scientific and engineering activities in the Government. And I wonder if an examination of that paragraph, Mr. Needles, might give us some guidelines as to your thinking with reference to activities that ought to be retained in present departments and activities which might be turned over to the new Department.

You are already committed on research and development as a func-

tion that might be exercised both in existing departments and the proposed new Department.

Then I was wondering about the training of scientific and engineering manpower. This is a function that is performed to some extent in existing departments. Is this a function that is wholly to be transferred to the new Department, or, again, are you thinking of a division?

Dr. KINZEL. This is the same question that we had a minute ago. And I would first answer it broadly, and that is that this whole suggestion has to be gone into in minute detail.

Now, in the conversations that I had with many of my colleagues, the only single group that they all seem to think should be transferred to this new Department is the Weather Bureau, strangely enough. Everything else has been controversial and the reason it has been controversial is that neither they nor I have the facts—all of the facts.

You absorb a great many of these facts by simply being around Washington, by serving on committees, as many of us have done since before World War II. But this is very different from going after the specific facts that you need to come to this kind of conclusion.

Senator MUSKIE. And is it conceivable, Dr. Kinzel, that when you have the facts you might reach the conclusion with respect to all categories of scientific and engineering activities in the Government there should be a division of each between the proposed new Department and existing departments?

Dr. KINZEL. There will be a division of men, certainly. But I think that the probabilities that you would have a division of all are extremely small.

Senator MUSKIE. There is not likely to be, then, in your judgment, any justification for a wholesale transfer of scientific and engineering programs to the new Department?

Dr. KINZEL. It all depends on how large you mean by "wholesale." I think there probably would be a justification for the transfer of quite a bit to the new department, and also justification for the taking into the new department of many of the independent agencies.

Senator MUSKIE. Which will the new department be, the dog or the tail?

Dr. KINZEL. I think the new department, starting small, will wind up being the dog without question.

Senator MUSKIE. With an effective bark?

Mr. KINZEL. With an effective howl.

Mr. NEEDLES. There are two things I want to emphasize in this statement, these problems that will exist in this transitional stage, even after the legislation has been enacted, there will be tremendous problems in making the transition that we are looking forward to.

The second thing is that the Engineers Joint Council stands ready to help you in any possible way in developing not only what you considered to be proper legislation, but also the arrangements for setting it up, and I also want to express my complete appreciation of the opening statement by the chairman in which he stated that this was sort of a first step, and that refinements and improvements were to follow, and it is in that we would like to assist, because we do believe in the principle.

Senator MUSKIE. I have just one other point that I should like to touch upon lightly.

That is with reference, Mr. Needles, to your statement that there is a need for development of additional manpower in this field an observation with which, I am sure all of us would agree. I wonder if you could enlighten us as to exactly where the shortages lie in this field, and what is the cause of the shortages.

Mr. NEEDLES. Sir, I am a civil engineer, not too closely identified with industry in which the big shortages and imbalance have existed prior to this time. I can assure you that the Engineers Joint Council is deeply interested, and for the past 3 or 4 years we have had Engineering Manpower Commission and Scientific Manpower Commission working to deal with these problems and the changing conditions which are developing from month to month, you might say.

But I am not able to give you a concrete, specific statement as to what our needs are today and how they can best be met.

Dr. Kinzel might have some ideas on that that would be appropriate.

Dr. KINZEL. Well, the shortage exists primarily in what has been referred to so often recently as the uncommon man, that is, we need a man who thinks for himself, who is a leader. We need more of them in both science and engineering, a lot more of them.

One way to get more of them is to have more total. There is a shortage in the total in some areas as well, some areas of science and engineering as well.

As to what to do about it, that is another story. But my own opinion has long been that this goes back to motivation of the young people back in the preparatory high school stage of their life, and that this lack of motivation stems from lack of sufficient recognition by the public of not only science, but more particularly engineering.

Senator MUSKIE. Do you think that this proposed department would correct that situation?

Dr. KINZEL. I think this department could do much in this direction, yes, sir.

Senator HUMPHREY. Thank you very much for the splendid statement and your interpretation, Dr. Kinzel.

By the way, gentlemen, do you have copies of Senate Report No. 120?

Mr. NEEDLES. Yes.

Senator HUMPHREY. And copies of Senate Document No. 90 of the 85th Congress, which is a staff report, analysis, and summary of the proposed Science and Technology Act of 1958?

Mr. KINZEL. Yes, we do.

Senator HUMPHREY. The subcommittee would appreciate any memorandum that you would like to submit outlining any suggestions you may have as to what agencies, bureaus, or services should be transferred to the Department of Science and Technology as you see it.

We will treat it as either confidential or make it a part of the hearing—just as you wish.

I am very serious about this because I think we need the advice and counsel of you men who are deeply involved in this whole area of science and engineering.

Mr. NEEDLES. Sir, we would be very happy to designate a committee of carefully selected personnel to work with you in that matter. We would not want to develop ideas on our own, submit them gratuitously, but we would be very anxious to assist you in such development as you may undertake.

Our secretary knows your staff director, Mr. Reynolds, very well. They are not strangers to each other and we would be very happy to keep abreast of things and assist in every way we can.

Senator HUMPHREY. Very good.

Mr. Reynolds will follow through on this, I know. He is intimately acquainted with this proposal. He has done most of the basic work that we have needed in order to even project this proposed legislation before the public.

Dr. KINZEL. Should you set up a commission as has been suggested or a committee to work up, as it were, our suggestions, we would be happy to be a part of that or work with them as you suggest.

Senator HUMPHREY. Thank you, very much.

The next witness is from the American Chemical Society, Mr. Alden H. Emery, executive secretary. We welcome you, Mr. Emery to the committee.

STATEMENT OF ALDEN H. EMERY, EXECUTIVE SECRETARY, AMERICAN CHEMICAL SOCIETY

Mr. EMERY. Delighted to be here.

Mr. Chairman and members of the committee, we were very glad to be invited to participate in this event because we are an important organization. We have filed a prepared statement. Undoubtedly it will raise points that you wish to discuss.

My name is Alden H. Emery. I am executive secretary of the American Chemical Society, the largest professional organization in the world devoted to a single science. The society was organized in 1876. In 1937 it received a national charter obtained with the approval and aid of five departments of the Federal Government.

Although I speak today as an individual, I believe the views I express would be supported by many of the 86,000 members of the society.

All members of our board of directors have discussed more than once the subject with which this hearing is concerned; their opinions are reflected in my comments.

As chemists and chemical engineers, we are more keenly aware than many of our fellow citizens of the extent to which our country's welfare and safety depend upon continuing progress to science and technology, or engineering, if Mr. Needles prefers.

We are greatly encouraged, therefore, by the increased emphasis placed in recent months upon these areas of national endeavor and by the concern of this committee with the subject.

We have read with special interest the findings of the Senate Government Operations Committee in 1958, and also the report of the President's Science Advisory Committee which led to the Executive order creating the Federal Council for Science and Technology. Only time can tell how successful the Council, primarily a coordinating and advisory body, will be in promoting closer cooperation

among Federal agencies in planning and managing their programs in science and technology. Whatever the outcome, we look upon establishment of the Council as a step in the direction of that highly desirable objective.

The need to strengthen American science and technology in order to maintain the Nation's leadership in these fields long has been a matter of concern to the society's board of directors. Particularly necessary, in our opinion, are better coordination among the Government's numerous and varied research efforts, continued and increased encouragement of basic research, and greater attention to certain areas of science which have not been swept into the spotlight by recent emphasis on matters obviously related to defense.

A year ago, in a statement of policy on "The Present Challenge to American Science and Technology," our board of directors included as 1 of 10 specific recommendations the following:

> Greater centralization of the Government's nonmilitary scientific and technological activities, with adequate financial support, under a director reporting to the President.

At the same time, the board also urged greater centralization of military research, under a director reporting to the Secretary of Defense.

Many factors were considered in making these recommendations. For example, grouping scientists provides mutual stimulation and also makes it possible to draw on varied knowledge and skills in solution of any problem. The kind of atmosphere most conducive to scientific progress is provided when policy decisions pertaining to science and research are made by scientists, or by administrators who through experience understand the scientific point of view. This is facilitated by some degree of centralization.

The spectacular achievements of industrial research in the United States have been made for the most part since industry centered its scientific activities in research and development organizations enjoying full equality with other major operating divisions.

For Government research to flourish, it must be able to attract and hold outstanding scientists who will be willing to make Government service a lifetime career. Men of this type are most likely to be interested if they can see the possibility of promotion to positions of high responsibility without having to leave the scientific field. Such positions can be provided only by grouping enough scientific activities together to build a sizable organization.

The attainment of balanced progress in science requires programing and decisions which will minimize duplication of effort and the consequent waste of scarce scientific manpower. Normally, sound planning and decisions cannot easily be obtained through a system in which a coordinating agency without authority makes recommendations to executives who do not understand the needs or techniques of scientific effort.

To obtain adequate operating funds for research and development work, science should have a competent spokesman who can determine the real needs and explain them effectively. He should be in a position in which his words bear weight. When scientific activities are scattered among various departments whose major interests are nonscientific, no outside spokesman for science can operate effectively.

From time to time demands arise for Government scientific work in new fields. A definite need exists for a Governmnt agency with broad scientific responsibility which can initiate the development of these activities.

Such were the considerations which led the American Chemical Society's board of directors to recommend greater centralization of the Government's nonmilitary research. The board's statement of policy containing this recommendation was distributed widely among Members of Congress and others, evoking many favorable comments. The board was aware that it had offered no specific suggestions for implementing its recommendation. In succeeding months, the need for a more definite proposal became increasingly apparent. Simultaneously, general public interest in the creation of a Federal Department of Science and Technology became more pronounced.

However, after some efforts to convert a generalization into a specific proposal, the board realized that it did not have and could not get the type of detailed information which it considered essential. Also, while we consider ourselves qualified to advise on scientific problems and organization, we are not experts on Government organization or management. Our scientific training leads us to stop short of detailed proposals for which we lack background. At its meeting in September 1958, therefore, the ACS board of directors made another recommendation and believe me, gentlemen, Dr. Kinzel and I have not been in consultation on this matter, unless he has read of it in the printed press reports. This action was taken in September 1958 but it is almost identical with what he proposed.

That the Congress of the United States appoint a commission (substantially similar to the Hoover Commission on Government Reorganization), including persons with scientific and technical background, to make a thorough study of scientific and technological activities within the Federal Government to ascertain the necessary relationship of each to an existing department of the Government and the benefits to each of possible association in a new organization devoted to scientific and technological affairs with the purpose of determining objectively the merits of a Department of Science and Technology and, if deemed desirable, of recommending which activities should be included in such a Department of Science and Technology.

The ACS board of directors continues to believe that a comprehensive study by such a commission is needed to determine the best way to obtain greater centralization of Government research and development, and I can report this matter was discussed as recently as the 6th of April and that still is the opinion of our board.

If a Department, such as it proposed in S. 676, is created, certain aspects of its nature and organization, in our opinion, deserve especially careful consideration.

Notable among these is determination of the proper scope for a Department of Science and Technology. All military research and development work, we believe, should be excluded because it is so highly specialized. The nonmilitary activities to be incorporated should be concerned primarily with basic, rather than applied, science. We see no compelling reason for bringing all the Government's nonmilitary research and development activities into a Department of Science. Scientific organizations which are closely related to the primary interests of existing departments might well be left there, especially if they are of such a size as to provide within themselves the

benefits of centralization previously mentioned. The units most likely to gain by incorporation into a Department of Science are those smaller groups now scattered among various departments and agencies where they have little relation to other parts of the organization and do not receive the attention and support they deserve. Also, it is worth noting that certain areas of governmental research profitably could be expanded greatly. They could be nurtured in a Department of Science.

It still is our belief that only an exhaustive study by an independent commission can determine which Government scientific groups should be incorporated into such a Department, if one is created, and can provide adequate solutions to such other problems as the development of an organizational plan in which scientists would hold high echelon positions and would make policy decisions on scientific matters. To accomplish these purposes, the commission should include a substantial number of top level scientists experienced not only in the conduct of research but in its organization and administration. There are many such men and I am sure that they would be only too glad to serve.

We are confident that the recommendations of such a broadly representative commission would prove acceptable alike to the Nation's scientists and to the other groups now concerning themselves with this problem, despite their widely varying interests and points of view.

Since I have commented entirely on the benefits of centralization of research, it is important to make clear that we believe the Federal Council for Science and Technology can be a useful agency, that it is desirable regardless of the decision made on the bill now under consideration. There always would be scientific work outside a Department of Science which well might function more effectively when coordinated with the programs of such a Department. Yet, the Council itself provides none of the benefits of centralization which I enumerated in explaining our original recommendation.

In closing, gentlemen, I wish to thank you for the opportunity to comment on this bill and to assure you that the American Chemical Society is available, as it always has been in the past, to render such assistance as you desire and that we are competent to give.

Senator HUMPHREY. Thank you very much, Mr. Emery.

Just one or two questions on my part.

When you refer to the Federal Council for Science and Technology, you are referring to one that was recently established?

Mr. EMERY. Yes. To the Killian operation.

Senator HUMPHREY. Yes, the one that was set up within the Executive Office of the President.

Mr. EMERY. Yes.

Senator HUMPHREY. And you make reference, as Dr. Kinzel did, to the importance of an objective commission to look into this whole matter of what to do about regrouping our science activities, the allocation of certain agencies, bureaus, et cetera, to a new department or agency. Tell me a little bit more. What do you have in mind for that commission?

We are old hands at passing legislation around here which sets up commissions, but there are all kinds of commissions.

How do you think this commission should be set up? What would be its composition? How large should it be? Should the members be appointed by the President, or should they be named partly by the President and partly by the Congress? Should the members all be public figures or should the membership be a mixture of public and private?

You know we have every kind of formula. You name the combination and we have a formula. Now what is your formula?

Mr. EMERY. I have no formula, sir.

Senator HUMPHREY. I think yours would be good. I would like to know.

Mr. EMERY. Well, sometimes the best kind of formula is not to have one, but to ad lib.

My formula would be to pick men, men of stature among scientists and in the public eye, and you have many of them.

For example—and I am using this just as an example—the appointment of Dr. Killian to his present post met general favor with the public, for they knew Dr. Killian in his capacity of president of MIT. It met favor among the scientists because they had seen how he administered science at MIT. So far as I know, no one quarreled with that selection. There are other men of the same caliber.

I probably should not make this statement, but you undoubtedly will run into it, if you haven't already, that the scientific community will not always accept a decision which you have made, which you believe sound, and which may be sound, unless they as scientists have had an opportunity either to reason the thing through from the facts as they know them, or to be certain that some other scientist represented in the group has had a chance to reason them through from the facts. Scientists can be pretty suspicious in accepting someone else's decision.

Senator HUMPHREY. Just as we are sometimes suspicious of some of their social decisions.

Mr. EMERY. Exactly.

Senator HUMPHREY. I don't mean I am, but I mean there are people that are.

Mr. EMERY. Well, I don't know why you shouldn't be at times.

Senator HUMPHREY. Well, I didn't want to give any public testimony, that is why.

Mr. EMERY. One reason we are not speaking here on what we think should be put in this Department is because we don't think we know enough. You are critical of individuals who speak on social problems, but who don't know enough about them to do so authoritatively.

Senator HUMPHREY. Well, I was not making any general accusation. I would just say that there is obviously a feeling on the part of the scientific community that lay people, people who are not acquainted with scientific methods, problems of science, are prone to make decisions about science without consultation with scientists, and I thoroughly agree that that is not right. They ought to be consulted. That is why we need the kind of suggestion that you are making.

I am really quite sincere when I say that it is one thing suggesting a commission, which I think has merit, but it is the composition of the commission, the authority of the commission, and the caliber of the commissioners that is going to determine what would happen.

Mr. EMERY. Would it help the situation if we dropped the word "commission" and substituted "committee" or something in place of it?

Senator HUMPHREY. Commission is fine. The Hoover Commissions had a particular job to do, because they related to the reorganization of Federal agencies, and dealt with the whole area of our executive branch of Government. Both the first and second Hoover Commissions were made up in part of Members of Congress, members of the executive branch, and the public.

Now, that skeleton of operation has had quite good public acceptance. I wonder whether or not a commission such as you were suggesting, and Dr. Kinzel suggested, should have the same type of structure, public members appointed by the President, executive members appointed by the President after consultation with the agencies, and then Members appointed from the House, and from the Senate, who have demonstrated some interest in this whole area of science, technology, and engineering. Is it your view that that is the kind of format that we ought to have for a committee or a commission?

Mr. EMERY. It is exactly the way in which I believe—I am speaking personally—a commission should be constituted. My only comment would be that proven science administrators be heavily represented among the public members. This is the point that I want to make. But as to the other types of representatives, by all means have them. I was not proposing an exclusively scientific commission. There are aspects of this matter that we don't know anything about and it is on those matters that the background of you gentlemen, for example, would benefit such a commission.

Much necessary information can be obtained only in private discussions with Federal administrators of science, not in public hearings.

As a matter of fact, I think one good source of information, that would have to be handled very judicially, would be among some of the active working scientists in the Government agencies. I think the public members of the commission could provide sort of a psychoanalyst couch for scientific administrators to tell what they think should be changed with assurance that information would go no further. There is a lot of side information that can be pertinent in any decision, as you, Senator, know very well, that never goes into the public record, and I think in this matter there are such situations.

Senator HUMPHREY. I think your last suggestion is very pertinent, very helpful, and I am sure that scientists within the Government and members of the scientific community would be exceedingly helpful to us in this study.

Mr. EMERY. And I am talking about people in a level that would have hesitancy, a little far down, not at the top, in talking to you or your staff because they would feel it was too official.

Senator HUMPHREY. Senator Muskie.

Senator MUSKIE. I have just one question, maybe a long one.

Mr. EMERY. Let's hope if it is a long one, the answer can be short.

Senator MUSKIE. I was interested in your suggestion, Mr. Emery, relative to the proper scope of the department.

I notice that you excluded, tentatively, at least, military research and development work and you suggest that nonmilitary activities should concern primarily basic rather than applied science. You sug-

gest that scientific organizations which are closely related to the primary interests of existing departments might well be left there, and you conclude that those most likely to gain by incorporation into a department of science are those smaller groups now scattered among the departments and agencies where they have little relation to other parts of the organization.

It strikes me that with these inclusions and exclusions what you might end up with is a department of insufficient size to justify Cabinet rank.

Is it your intention to suggest this as a possibility after the work of the proposed commission is completed?

Mr. EMERY. No, sir. I may have spoken too rapidly or drafted a sentence incorrectly if I gave you that impression.

The sentence to which you refer says specifically this: The units most likely to gain by incorporation now.

I jumped a river in between. This was the trouble.

I still feel that the units most likely to gain are the ones described. I would not limit it, I do not feel it needs to be limited to such agencies.

There are so many questions here that we ourselves do not know about. Let me use an example and it is only to illustrate, not to suggest.

If the regional laboratories of the Department of Agriculture, for example, are not thoroughly integrated into the rest of the work of the Department of Agriculture, I see no reason they couldn't be transferred, but if they are integrated—and this is what I do not know—then they should be left, I think, where they are.

Your bill does not propose their transfer. Maybe it is correct. Maybe it is wrong. I don't know. This is all I am saying.

On the other hand, I think that the one agency which you have proposed to include on which I have heard the most questions raised is the Atomic Energy Commission.

Senator MUSKIE. I was about to get to that.

Mr. EMERY. It is a very heterogeneous group in its objectives and operations. I think you could get into trouble if you had one tremendous agency with many medium-sized ones, this tremendous agency could be a dominate factor. Again, this is just a question to be investigated, not a proposal.

Senator MUSKIE. If you would apply your tests and your guide lines to the Atomic Energy Commission, the first impression would be that it would not be included in the Department.

Mr. EMERY. I think that that would be true, but this was not pointed at the Atomic Energy Commission.

Senator MUSKIE. I am sure it was not, and I am not trying to put you on the spot, Mr. Emery.

Mr. EMERY. I am accustomed to being on the spot.

Senator MUSKIE. You ought to be back here, then.

Mr. EMERY. On the other hand, one can set up, as we have done here, what we consider idealized guidelines. Probably you and I do it in our personal activities, but we often have to depart from those idealized guidelines merely because of practicalities. This would be governed by the same thing.

Senator MUSKIE. Would you think that the new department ought to be operational in its activities, in any way?

Mr. EMERY. If you had left off the "in any way" I might have answered it more easily.

I would say it should not involve any operating functions as I think over these activities today. You may come up now with a specific example where I might say yes.

Mr. EMERY. I think the chairman indicated we had gotten into an area here where maybe we shouldn't debate. I don't know enough about it to debate.

Senator MUSKIE. I am not debating with you, Mr. Emery. I really was curious as to the possibility of exploring specific application of your tests and I won't pursue it any further.

Mr. EMERY. Well, I don't object. I don't think that a Department of Science or whatever you are going to call it should have any regulatory powers, for example. I think that is not the atmosphere for good scientific operation, for one thing, myself.

Senator MUSKIE. Well, you eliminate the bark from the dog.

Senator HUMPHREY. I think what we seek to do in the proposal before us, whether it is a department or agency, whatever it may be, is to exercise greater coordination over the multitudinous scientific endeavors of the Federal Government.

I am not prepared at this moment to document what I am about to say, but it can be done. The Navy, the Air Force, the Army go around to universities with projects, scientific research projects, and sometimes they are duplicated. Undoubtedly, efforts are made to prevent duplication. But I can think of one university in which I know there has been duplication. In this instance public funds have been expended and for work that has already been underway by another department of the Government; the same people have been contacted by one department and asked again by another department to do the same work.

Well, now that may be an unusual example, and I think it is.

Mr. EMERY. You hope it is.

Senator HUMPHREY. Well, I think it is too. I really think it is. I think there is a determined effort made not to let this happen.

But knowing departments of Government, it is easier sometimes to communicate between Washington and Moscow than it is between the Pentagon and the State Department or between the Department of Health, Education, and Welfare and the Department of Defense.

It is much easier sometimes to communicate between Moscow and Washington than it is between the Department of Agriculture and the Congress. I know that. I have been trying to effect communication with that Department for some time.

Mr. EMERY. I am well aware of that. Many, many years ago, I spent 13 years in Government service so I know that side of it too.

Senator HUMPHREY. What I am getting at is that you have these agencies and bureaus scattered through the many departments of Government that are interested in scientific endeavor, and no one place where there is a spokesman for science, for basic research, for applied research. Everybody's business is nobody's business, a good deal of activity may go on that is duplicated. Some of it may not go on that ought to go on and there could well be wastage of vital manpower. I am not sure. These are just general rules that we apply in terms of public administration.

So what we seek to do is to get some way to focus more attention upon the problem.

Now, maybe Dr. Killian's group is doing that quite well. I think there has been a decided improvement in the creation of the new Federal Council on Science and Technology. I think this has helped because Dr. Killian can speak to a degree for the President. These independent agencies that are set off in the woods someplace now speak for themselves.

I am not at all unhappy about saying that I think it would be a good thing for the Atomic Energy Commission to be brought under a Department of Science and Technology. Maybe if we would want some more information from them on radioactive fallouts and some other things we could get it, and not play games, because then they would not be untouchable.

Just thought I would get that plug in, because I feel quite strongly about it.

I have no other questions to ask.

Mr. EMERY. So far as your premise was concerned on that, I think the American Chemical Society is in complete agreement with you. Its board passed this resolution more than a year ago, to which I would call your attention. It was just a principle, but it is the one you have just enunciated. One of its 10 recommendations was, greater centralization of the Government's nonmilitary, scientific, and technological activities, with adequate financial support, under a director reporting to the President.

We are together certainly on the basic principles. We are uncertain as to how it should be done. I gather that to some extent, at least, you are too.

Senator HUMPHREY. Well, Dr. Vannevar Bush back in 1940 said something like this. He pointed out that even then all through the Government there was proliferation of agencies and bureaus related to scientific endeavor, that there was no coordinated pattern, no centralized direction. I think it is better now. I don't want to be misunderstood. I think there have been efforts made that have been productive and constructive. The question is how much further do we go.

Scientists are frequently worried about having a Cabinet post because they think they may get political interference.

Mr. EMERY. Yes; this is the worry they have expressed. I am not concerned personally.

Senator HUMPHREY. Well, I think it depends on who the person is.

Mr. EMERY. Exactly.

Senator MUSKIE. Just one more question on this, Mr. Emery. It strikes me that a department of Cabinet rank should be and ought to be something more than simply a coordinating agency. You must have authority of some kind. The implication in the line of your comments this morning is that the authority in a regulatory sense at least should be at a minimum.

Mr. EMERY. Authority it should have, but it depends on what it has authority for. That would be the——

Senator MUSKIE. Could you enlighten us on that?

Mr. EMERY. I think that certainly a governmentwide policy in the field of science, policies as to what the Government should do in

various areas of science, scientific policies as they affect work that perhaps reaches into other departments—because there will inevitably be tie-ins. A research and development division in a company may be headed by a vice president and that vice president has authority comparable to the vice president in charge of production. But it is a different kind of authority that he exercises, different things that he does, different types of decisions that he makes. I think the same thing would exist in a department of science as compared with the Department of Labor, for example. It is just a difference in the type of decisions that they would have to make.

Senator MUSKIE. Well, for example, the proposed department presumably would have some jurisdiction in the research and development field. It is contemplated by previous testimony given this morning that certain research and development activities would be left in other departments. To the extent that policy decisions recommended by the secretary of the new department might affect research and development activities in other departments, whose authority would be overriding?

Mr. EMERY. This I think is one of the very important problems that you gentlemen or a commission or whatever body makes a final recommendation will have to bear in mind when you are deciding how to constitute this new department. I haven't the answer to that. It may decide you want to pull in almost all the scientific work. We may be wrong in feeling that where the activities are thoroughly integrated they should stay where they are. That is just our sentiment, but we have recommended this commission because we have said frankly we don't know enough about it to make specific recommendations. Your sentiment of drawing into a department of science almost all scientific activities might well prove to be the proper decision once the facts were on the table. I don't have those facts.

Senator HUMPHREY. Thank you very much, Mr. Emery.

We are grateful to you.

Dr. Howard A. Meyerhoff, Executive Director of the Scientific Manpower Commission is our next witness.

Dr. Meyerhoff, won't you proceed?

STATEMENT OF DR. HOWARD A. MEYERHOFF, EXECUTIVE DIRECTOR, SCIENTIFIC MANPOWER COMMISSION

Dr. MEYERHOFF. My name is Howard A. Meyerhoff. I am a geologist by training and, as a scientist, I have been selected by my colleagues to serve as Executive Director of the Scientific Manpower Commission. The commission is a private organization, founded in 1953 by the major scientific groups of the Nation. These groups embrace virtually all agricultural scientists, astronomers, biologists, chemists, earth scientists, mathematicians, physicists, and clinical and experimental psychologists. Each of the 10 sponsoring scientific organizations nominates two of its members to represent it, thus giving the Scientific Manpower Commission a total membership of 20. The roster of members in 1958 is in a brochure, I would like to have inserted in the record.

Senator HUMPHREY. Very well. The brochure will be inserted at this point in the record.

(The brochure referred to follows:)

SCIENTIFIC MANPOWER COMMISSION

WASHINGTON, D.C.

American Association for the Advancement of Science
American Astronomical Society
American Chemical Society
American Geological Institute
American Institute of Biological Sciences
American Institute of Physics
American Psychological Association
Conference Board of the Mathematical Sciences
Federation of American Societies for Experimental Biology
Policy Committee for Scientific Agricultural Societies

In June 1950 it looked as if the supply of engineers and scientists had been brought into balance with the demand. Just how precarious that balance was the Korean war revealed. To deal with the situation that was immediately critical, the Engineering Manpower Commission of Engineers Joint Council was organized, and the scientific socities founded the Scientific Manpower Commission. Without losing their separate identities, these two organizations have coordinated their activities ever since they came into being and can claim some credit for the following developments:

A SUMMARY OF THE RECORD

Enrollments

To reverse the downward trend in college enrollments, special efforts were made to promote careers in science and engineering through vocational guidance literature, press interviews, radio programs, speeches, and conferences. Thanks to liberal participation in this effort by the advertising council, scientific and engineering societies, industry, and the press, the downward trend in engineering was reversed in 1954, and in the physical sciences 1 year later.

Training

One obstacle to the recruitment of qualified young people was quickly found to be the inadequacy of their precollege training in basic subjects, especially in mathematics. With the cooperation of the advertising council, industry, and the societies, the slogan "Take Math!" was promoted, with results that are only now becoming measurable.

Recognizing that training is no better than the quality of the instruction received at every level, the Commissions have supported each effort to recruit and train good high school teachers. In two 1957 conferences they initiated a program to provide finances, faculties, and facilities for the instruction of the increasing numbers of young people in departments of science and engineering.

Utilization

Elimination of waste and more effective utilization of available resources offered the only means of quick alleviation of the manpower shortage, and the two Commissions neglected neither, with the following results:

1. The cooperation of the Selective Service System was sought and ultimately obtained in the application of occupational deferment policies to critically employed engineers and scientists.
2. The heavy military drain on qualified student personnel in training was reduced.
3. Utilization of men in the scientific and professional personnel program of the Army has been slowly improved.
4. Recognition of the importance of engineers and scientists to the national security was finally achieved in the Reserve Act of 1955. A Presidential directive established a maximum 6-month training period for skilled personnel employed in activities essential to the national welfare, and prescribed quick screening from the Ready to the Standby Reserve.
5. Utilization conferences have promoted—
   (*a*) More effective use of technological personnel in industry;
   (*b*) Reduction in turnover;
   (*c*) Interest in the supply and training of technicians;
   (*d*) Upgrading of professional personnel.

Surveys

The Scientific Manpower Commission initiated the first survey of demand for scientists. It gathers and correlates statistics and factual material and is generally recognized as a source for authoritative information on all aspects of the scientific and technological manpower situation.

Publicity and publication

The EMC-SMC Newsletter, issued monthly, was the first publication in the field concerned wholly with matters affecting specialized manpower. Its circulation has risen steadily and now exceeds 12,000. It is widely consulted and quoted. SMC has no other regular publication, but the staff has issued many statements, written numerous articles, and contributed material for literally hundreds of news and magazine stories.

Government relations

The Engineering and Scientific Manpower Commissions function as liaison agencies with all branches of the Government dealing with engineering and scientific manpower. The executive officers of the two Commissions are non-Government members of the Committee on Specialized Personnel and of the Executive Reserve of the Office of Defense Mobilization. Close working relations are maintained with national selective service headquarters and with the Manpower and Reserve sections of the Department of Defense and the Department of the Army. Collaboration on specific projects has been maintained or undertaken with the National Science Foundation, the Bureau of Labor Statistics, the U.S. Employment Service, the Civil Service Commission, the President's Committee on Scientists and Engineers, and the Legislative Reference Service of the Library of Congress. Committees of the Congress call upon the Commissions for advice and for testimony in hearings, and individual Congressmen frequently seek information and guidance.

NINETEEN HUNDRED AND FIFTY-EIGHT: CHALLENGE AND OPPORTUNITY

Early 1958 bore one striking resemblance to early 1950. Graduations in science and engineering increased, and an extra year's supply was made available for employment by changes in military policy. Governmental economies and a pause in the economic upswing also contributed to bring the professional manpower supply closer to meeting the demand than at any time since June 1950.

The near balance that existed, however, was precarious and temporary. The total impact of sputnik has yet to be assessed. Bills under consideration in the Congress would accentuate the continuing shortage of teachers at all levels by draining potential teachers into research. Growing emphasis upon basic research and development will quickly create new demands for highly trained and skilled personnel in industry and Government.

Although none of the regular services provided by the Commission can be neglected, impending events call for a three-point program of intensive action in 1958:

1. Requests from the legislative and administrative branches of the Government, already numerous and exacting, must be given the right-of-way.
2. The public must be accurately informed of the facts concerning our technological situation and needs through every available medium.
3. There must be an unremitting effort to interest well-trained and qualified young people in the scientific professions and to ensure that our institutions of higher learning have the faculties, the finances, and the facilities to give them the high quality of training our science and technology require for national survival.

MEMBERS OF THE SCIENTIFIC MANPOWER COMMISSION

Nominated by American Association for the Advancement of Science:
Detlev W. Bronk, Rockefeller Institute for Medical Research.
M. H. Trytten, National Academy of Sciences-National Research Council.
Nominated by American Astronomical Society:
Geoffrey Keller, National Science Foundation.
Freeman D. Miller, University of Michigan.
Nominated by American Chemical Society:
M. T. Carpenter, Standard Oil Co. of Indiana.
B. R. Stanerson, Americal Chemical Society.

Nominated by American Geological Institute:
John C. Frye, Illinois Geological Survey.
Howard A. Meyerhoff, Scientific Manpower Commission.
Nominated by American Institute of Biological Sciences:
Frank P. Cullinan, Agricultural Research Service.
John S. Nicholas, Yale University.
Nominated by American Institute of Physics:
Henry A. Barton, American Institute of Physics.
Elmer Hutchisson, American Institute of Physics.
Nominated by American Psychological Association:
Meredith P. Crawford, Human Resources Research Office.
Edward A. Rundquist, U.S. Government.
Nominated by Conference Board of the Mathematical Sciences:
E. G. Begle, Yale University.
Stewart S. Cairns, University of Illinois.
Nominated by Federation of American Societies for Experimental Biology:
Chauncey D. Leake, the Ohio State University.
Milton O. Lee, Federation of American Societies for Experimental Biology.
Nominated by Policy Committee for Scientific Agricultural Societies:
John E. Foster, University of Maryland.
C. Loyal W. Swanson, the Texas Co.

Dr. MEYERHOFF. The Commission was established by these scientific groups to deal with manpower problems common to them all; hence it acts in behalf of the 200,000 scientists who are members of these 10 organizations and their affiliates. It does not pretend to be their sole spokesman or to represent the views of all of them, but I think it safe to say that it does represent the opinions of a vast majority of the scientists of the Nation.

The creation of a new department of government with a Secretary of Cabinet rank can be justified only if departmental structure will integrate scattered functions that call for integration, perform essential services that may be—or are being—otherwise neglected, and provide a permanent spokesman at the highest executive level on matters of fundamental national concern.

Even casual browsing through the Congressional Directory reveals a bewildering assortment of independent agencies concerned with technology. There are the Interdepartmental Committee on Scientific Research and Development, the Atomic Energy Commission, the National Aeronautics and Space Administration, the National Science Foundation, and the Smithsonian Institution, not to mention some 35 other agencies, bureaus, and boards whose responsibilities bear directly or impinge upon technological activities and interests of the Federal Government. Last year there was also the President's Committee on Scientists and Engineers.

Functioning beyond the pale of the Congressional Directory are the President's Science Advisory Committee and the Council of Science and Technology. In proposing the establishment of the Council, the panel on research policy of the President's Science Advisory Committee stressed the need of "an effective instrument of Government made up of representative Government officers, that can promote closer cooperation among Federal agencies in planning and managing their programs in science and technology and in achieving their coordination." Inasmuch as the Interdepartmental Committee on Scientific Research and Development, which is also composed of high-level representatives of the departments and agencies involved in research, was set up for the same purpose, the functions of the newly created

Council for Science and Technology are obscure, despite the attempt of the panel to differentiate them.

Senator HUMPHREY. May I interrupt you?

Dr. MEYERHOFF. Yes, sir.

Senator HUMPHREY. I am fascinated by this description of the many agencies and bodies that are handling some aspect of scientific activity in the Federal Government.

In the statement before me, you mention the President's Science Advisory Committee and the Council for Science and Technology, those are two separate agencies or one?

Dr. MEYERHOFF. I understand they are separate. The Council was recommended by the President's Science Advisory Committee and I believe the President's Science Advisory Committee still continues.

Senator HUMPHREY. That it what I understood, too. I was of the opinion that the Council was supposed to take over some of the duties of the Advisory Committee.

Dr. MEYERHOFF. Yes, but not abolish it, not replace it.

Senator HUMPHREY. Believe me, I want to tell you that it takes more than an act of Congress to abolish an agency.

Well, now, we come down a little bit later and—where was the other one that you read?—an Interdepartmental Committee on Scientific Research and Development.

Dr. MEYERHOFF. Yes, sir.

Senator HUMPHREY. What is its relationship to the President's Science Advisory Committee and the Council for Science and Technology.

Dr. MEYERHOFF. None whatever except that it is listed in the Congressional Directory as an independent agency of the Government, and I thought a very useful one in that it brings together people at top level, or close to top level, in the agencies involved in research and development. For example, the Bureau of Standards, and the National Science Foundation. Dr. Waterman, for example, is the Chairman and Thomas Nolan of the U.S. Geological Survey is Vice Chairman.

Its function was to determine what is going on in the several departments and then to coordinate and to the extent possible avoid duplication that has been deplored by you and the other Senators this morning.

Senator HUMPHREY. Senator Muskie just said a moment ago that he thought we needed an agency to coordinate the coordinating agency committees.

Dr. MEYERHOFF. Yes; committee on committees in fact.

Senator HUMPHREY. Yes.

Section 6 of Executive Order 10807 establishing the Federal Council for Science and Technology, says:

> Other orders; construction of under subsection (a) provides that Executive Order 9912 of December 24, 1947, entitled "Establishing the Interdepartmental Committee on Scientific Research and Development" is hereby revoked.

Dr. MEYERHOFF. So it is replaced by the Council?

Senator HUMPHREY. What is that?

Dr. MEYERHOFF. So it is replaced by the Council?

Senator HUMPHREY. I heard a gentleman in the back of the room who says no. This is a fascinating experience, to know what is alive and what isn't.

Dr. KINZEL. That which was abolished was not the President's Advisory Committee. It was something else.

Senator HUMPHREY. What was abolished was the Interdepartmental Committee on Scientific Research and Development.

Dr. KINZEL. That is right, but not the President's Advisory Committee.

Senator HUMPHREY. Thank you.

I am sorry to interrupt your fine testimony, Dr. Meyerhoff, but you were taking this through a sort of labyrinth here. I enjoyed it.

Dr. MEYERHOFF. Good. Well, I am glad to know then, that the duplication that I saw in the two agencies, in reading the Congressional Directory, has been eliminated.

Senator HUMPHREY. But the Advisory Committee still continues.

Dr. MEYERHOFF. Yes, sir.

Senator HUMPHREY. Go right ahead. Thank you for letting me interrrupt you.

Dr. MEYERHOFF. You can do that any time, Mr. Chairman.

If the authority is needed, it can be acquired only through an officially established department, permanently represented at the Cabinet level. The President's Science Advisory Committee and the Council lack permanent status and acquire a voice in the Cabinet only at the pleasure of the President. This, indeed, is the current official status of all technology in the Federal Government—it has only the standing and the stature that the President chooses to give it. That President Eisenhower does attach considerable importance to science and engineering is evident in his own words describing—

> the strength of American science and technology as one of our essential resources for national security and welfare.

Neither I as an individual nor the Commission I represent makes any claim to competence in advising what agencies and bureaus of Government may properly be included in a new Department of Science and Engineering. At this point, may I digress to say that, like the engineers, we believe the word "technology" is inappropriate; hence we hope that the name of the department, if created, will be the Department of Science and Engineering.

In testifying before this subcommittee I shall limit myself to my field of competence—namely, technological manpower, more especially as my colleagues Messrs. Needles and Emery have effectively covered other aspects of the subject so well, but have left something more to be said regarding the place of manpower. Indeed, this was brought out in one of the earlier questions from you people on the committee.

Senator HUMPHREY. Yes.

Dr. MEYERHOFF. It is patent that science and engineering are abstractions that acquire substance only through scientists and engineers. Our Nation's technological strength is wholly dependent upon the corps of scientists and engineers who are practicing their professions and applying them to the research and development needs of the Nation. Despite the vital importance of manpower to this essential resource for national security and welfare, there is not a single Federal agency in which it is a major concern. In fact, there is no national manpower policy in the vast field of technology, notwithstanding the fact that a technological policy is virtually meaningless if it does not extend to the brainpower required to implement it.

Manpower is not a concern of the President's Science Advisory Committee—the Engineering and Scientific Manpower Commissions have a letter in their files from one of Dr. Killian's aids stating this in so many words.

The National Science Foundation has an Assistant Director for Scientific Personnel and Education, but the function of his office, and quite properly so, is primarily the conduct of research and surveys. Indirectly his office is furthering the training of young scientists through institutes for teachers of science, and the Foundation is promoting progress in science through the distribution of grants and fellowships. But this is a far cry from the policymaking agency that is so urgently needed to conserve the manpower resources of the Nation.

The Office of Education in the Department of Health, Education, and Welfare is likewise engaged in an indirect effort to promote science as it implements the provisions of the National Defense Education Act of 1958. The only agency concerned solely with manpower questions, though not specifically manpower policy—the President's Committee on Scientists and Engineers—was abolished on December 31, 1958. Its precarious hold on life is evident from its fate.

In only one remaining governmental body is there any official responsibility for overall manpower policy—namely, in the Office of Civil and Defense Mobilization. This is an emergency agency which, so far as I am aware, exists at the pleasure of the President. In its recent reorganization under the directorship of Governor Hoegh, there are directors of special liaison, security and inspection, administration, program and policy, health services and research, but not manpower. There are assistant directors of plans and operations; of training, education, and public affairs; and of resources and production. Again, no manpower.

Under the Assistant Director for Resources and Production there is a Deputy Assistant—one of seven deputy assistants—for manpower. Here is the only place in the executive branch of the Government where manpower policy is a concern, and even here scientific and engineering manpower is relegated to a committee on specialized personnel and is one of several responsibilities of the Deputy Assistant Director for Manpower.

Judging from congressional concern about our technological strength, I feel sure this committee is not content to have technological manpower policy relegated to a committee under a deputy to an assistant to the director of an emergency organization. An organizational chart illustrates graphically how far down in the OCDM structure scientists and engineers have fallen:

1st echelon	*2d echelon*	*3d echelon*	*4th echelon*	*5th echelon*
Director, OCDM.	Division Directors.	Assistant Directors.	Deputy Assistant Directors.	Committee on Specialized Personnel.

They are five layers deep. Surely their importance entitles them to a higher place in governmental operations. I hasten to add that manpower problems are currently receiving serious and competent attention in this rather obscure spot.

The one department of the Federal Government that has a manpower policy of its own is the Department of Defense. Its interests, however, are limited to the military field. That its requirements for military manpower do not clash more sharply with the Nation's needs for scientists and engineers can be attributed to the wisdom of the Director of Selective Service, Gen. Lewis B. Hershey. General Hershey himself would question—and, indeed, has questioned—the propriety of permitting so much power to reside in the discretion of a single person, whose tenture of office is by no means assured for an indefinite period of time. Since 1954 the Selective Service System, through its Director and its staff, has had more to do with shaping national policy on scientific and engineering manpower than all other Government agencies combined, but this policy applies only to men ranging from age 18½ to age 35. For the rest of the technological profession there is no direction—in fact, not even a directory, or roster, that can be efficiently employed to quickly mobilize the Nation's technologists in a dire emergency.

A Department of Science and Engineering, if created, should make the manpower to implement technology the backbone of its structure. It should not be consigned, even now, to a fifth echelon in the chain of command in an emergency agency that was formed by one administration but may be abolished by the next. The professional societies saw clearly the need for private agencies to aid them, the Government, and members of the professions when the Korean conflict raised so many problems in technological fields. It was then that the Engineering Manpower Commission of Engineers Joint Council and the Scientific Manpower Commission were founded.

And here at this point, Mr. Chairman, may I comment that the American Chemical Society was most interested and instrumental in having the Scientific Manpower Commission formed.

They are charged with the responsibility of formulating and proposing policies of recruitment, training, and utilization that will be of benefit not alone to the professions but also to the Nation. The efforts of these two Commissions have met with only partial success because there is no single top level agency of Government with which they can cooperate.

Scientists and engineers are the measure of our country's technological strength, and a manpower division or bureau might well be the keystone of a Department of Science and Engineering. At present, professional manpower is nobody's business, although General Hershey has, happily, assumed a moral responsibility for the administration of one important segment of the entire technological situation. Just as my colleagues Messrs. Needles and Emery have stressed the need for the centralization of responsibility for technological policies and activities, so I wish to emphasize the dire need of a responsible Federal agency that can and will see scientific and engineering manpower problems in perspective.

Our Commission appreciates the invitation to present its views to this committee. It is ready and willing to further the committee's work in every way possible and will welcome the opportunity to do so.

Senator HUMPHREY. Mr. Meyerhoff, we are very grateful to you for a most illuminating and helpful statement.

I did not know that our Federal Government was so devoid of Federal manpower policy. Let me see if I get the record straight.

There is a type of manpower policy in the Department of Defense.

Dr. MEYERHOFF. Yes, sir.

Senator HUMPHREY. Mr. Hanna, the president of the Michigan State commission, I believe was the Director of Manpower for the Department of Defense; isn't that correct?

Dr. MEYERHOFF. That is correct.

Senator HUMPHREY. He has a successor.

Dr. MEYERHOFF. Yes; this is the third successor. I have forgotten his name.

Senator HUMPHREY. That is military manpower.

Dr. MEYERHOFF. That is military manpower exclusively, although there is, of course, some concern about the provision of research and development in the several services.

Senator HUMPHREY. But it is manpower as relates to the needs of the Department of Defense.

Dr. MEYERHOFF. Entirely.

Senator HUMPHREY. And then in the new Office of Civil and Defense Mobilization there is a fifth echelon, assistant in charge of specialized training; is that right?

Dr. MEYERHOFF. Yes, sir.

Actually the work is performed by a committee of Government and nongovernment people. I happen to be a member, and so I know intimately the work that it is doing. Under its present Deputy Assistant Director it is doing a very serious job in surveying the manpower needs of the Nation, but of course, it is powerless to implement them.

Senator HUMPHREY. It is powerless to what?

Dr. MEYERHOFF. I mean its conclusions.

When the committee passes a resolution we never know what will happen to it.

Senator HUMPHREY. In the light of our tremendous international responsibilities and in the light of the fact that we appropriate billions of dollars to send people all over the world, how do we determine if we have these people?

Dr. MEYERHOFF. The best agency for determining the roster of scientific personnel is the National Science Foundation which, through most of our sponsoring agencies in the Scientific Manpower Commission and through the Engineers Joint Council, has compiled a roster which, however, is not complete. It is based primarily on scientific society memberships and then any other freelances that they may be able to corral.

Senator HUMPHREY. That is a census, isn't it?

Dr. MEYERHOFF. It is more or less a census, yes, sir.

Senator HUMPHREY. Let us say for example that we give the President the $4 billion that he wants for foreign aid this year, of which a good chunk is for military assistance of dubious value. He says he needs it, he needs the $3,900 million. How do we know that we have adequate people to undertake the many projects that are being outlined?

Dr. MEYERHOFF. I have some figures that are not firmly in my head, Mr. Chairman. They are 6 months old. They were supplied to me

by the International Cooperation Administration. At the time the figures were reported to me, which was approximately September-October, they had something on the order of 6,000—no, 2,000 posts filled and better than 600 vacancies.

SenatorHUMPHREY. What group was that?

Dr. MEYERHOFF. This was the International Cooperation Administration.

Senator HUMPHREY. ICA?

Dr. MEYERHOFF. ICA, yes, sir.

So that there is one place where the ability to secure personnel is measured. They have trouble filling those 600 spots.

Senator HUMPHREY. Well, I have been concerned about this and your testimony struck a very responsive chord.

The Committee on Government Operations in 1957 released a report, with the cooperation of Dr. Charles A. Quattlebaum, specialist in education, Legislative Reference Service, Library of Congress, entitled "Development of Scientific, Engineering, and Other Professional Manpower."

I believe that is about the most comprehensive report that has been done on the subject and there was wide acceptance and keen interest in it, but it is rather shocking that a nation that is competing with the Soviet Union, supposedly, all along the front has such little concern about the manpower needs. We seem to be strong on appropriations and expenditures and short on getting the people that we need to do the job.

Dr. MEYERHOFF. Well, may I point out——

Senator HUMPHREY. I am just generalizing but this has bothered me for a long, long time because everytime we run short of an idea we throw around some greenbacks.

Dr. MEYERHOFF. I should like to make an observation that is of current interest to me.

We do not know how many scientists and engineers we have abroad. We know, of course, those who are abroad in Government service.

But take the oil companies with a large complement of geologists, geophysicists, petroleum engineers, civil engineers, and engineers in the other fields and sometimes there are scientists in other fields. We have no count of them at all. If we counted the number of engineers and scientists employed in private industry, we would find ourselves actually with a tremendous foreign contingent that could be effectively used, but we don't even have a count. There is no effort to use them, you see, in carrying the works of American democracy to other countries. Yet I am sure that companies would gladly cooperate in having that as, shall we say, an extracurricular activity. But there is no counting at all. They outnumber by far the number of Government scientists and engineers abroad and the total outnumbers the number of Soviet scientists and technologists abroad.

Last year the Department of State estimated that there are 1,600 Soviet scientists in underdeveloped countries.

Senator HUMPHREY. In the subcommittee's report this year entitled "Science Program—86th Congress," reference was made to the NATO Science Committee on page 6.

It says:

NATO has strengthened its organization for promoting the use of science, both by NATO itself and by the member countries. During the year a science adviser to the Secretary General of NATO was appointed and a NATO Science Committee established.

This is quoted from Dr. Killian's report.

But what I have often wondered is whether there is any compilation of scientists within the NATO community. I asked this question simply because I happen to believe that in this struggle with international communism you need the help of friends. This isn't a U.S.A.-U.S.S.R. fight. This is a struggle between international communism and free peoples everywhere. I wonder if we have ever tried to find out just how many free people, trained scientists, engineers, and technicians are being put to the work that needs to be done, or whether we are just running around swinging in the dark hoping that some of them are hitting something. You ought to know.

Dr. MEYERHOFF. Are you speaking of the whole NATO?

Senator HUMPHREY. Yes.

Mr. MEYERHOFF. Efforts are being made and have been practically completed in the United Kingdom to get a count of their scientists.

The French have quite recently become interested and although I am not aware that the census has been completed, I know that it is in progress or near completion.

Senator HUMPHREY. In France?

Dr. MEYERHOFF. Yes, sir, in France.

There are also counts in Germany, Belgium, and Holland. I do not know anything about——

Senator HUMPHREY. Are these coordinated?

Dr. MEYERHOFF. Yes, sir. It is being coordinated through the NATO committee that is headed by Senator Jackson. I am quite sure that you will find——

Senator HUMPHREY. That is the NATO Parliamentarian Committee?

Dr. MEYERHOFF. Yes, sir.

Senator HUMPHREY. Parliamentarians don't run things. Executive branches run things. Parliamentarians meet once a year, but I want to know what is happening in the NATO Council. What about the day-by-day accomplishments?

Dr. MEYERHOFF. I wouldn't know

Senator HUMPHREY. That is what counts. This other stuff is just window dressing.

What we need is a tabulation of the manpower we are supposed to have so that we know where it is, whether it is alive or dead, whether it is in France, Great Britain, Norway, Denmark, or whatever country, how many do we have, how well trained they are, where they are, what they are able to do that they are not doing, and how are we going to use them. Do you have any idea about that?

Dr. MEYERHOFF. Not accurate enough to make a statement, Mr. Chairman.

Senator HUMPHREY. Does anybody have an idea about it that you know?

Dr. MEYERHOFF. I would say not. I could set down a set of figures with quite a little homework, but it would be at best an estimate for the countries outside the United States and the United Kingdom.

Senator HUMPHREY. What I am getting at is, does anybody in the Government of the United States or in the NATO Council that you know of—these are the official bodies—do you know of any office that has all of this information as I have described it?

Dr. MEYERHOFF. No, sir; I do not. I understand it is being collated, but where it will be assembled I do not know.

Senator HUMPHREY. We started to do that in December 1957 when Sputnik was put up. We got all excited and got prickly heat. What has happened since? Is there the same degree of excitement and concern?

Dr. MEYERHOFF. No, sir.

Senator HUMPHREY. This is what I worry over. This is my concern, that we sort of come to fits and starts and then we ease off. Is that about right?

Dr. MEYERHOFF. I am afraid you are right, sir. I am sorry to admit it, but we see that in our work.

Senator HUMPHREY. Are you making any recommendations specifically for a central manpower organization in the U.S. Government?

Dr. MEYERHOFF. I believe that such an organization would be most useful in many ways, and that, as I stated in my testimony, it might well constitute a keystone agency within the Department that has been proposed.

Senator HUMPHREY. That is one of the reasons that you feel that a Cabinet level Department would have some genuine merit, as I understand it.

Dr. MEYERHOFF. Yes, sir; it is just one of the reasons but since my colleagues covered the other ground so well I thought I might well stress this one.

Senator HUMPHREY. I think it is a shocking thing to hear that we have no better plans and programing and official status for manpower utilization organization than I have heard here today. Really it is very upsetting.

Dr. MEYERHOFF. Well, to us it has been a source of futility very often.

Senator HUMPHREY. I think we are just confused. If we win it will be really with the arm of the Lord around us, because we surely aren't working at it.

When you hear these things day after day—and I have heard this year after year—I get very upset about it. There is just nothing being done. All they can think of doing is just building another bomb.

I am a cynic on this business as you gather by now. All you have to do around here is say you are going to launch something from Cape Canaveral; you get everybody excited. Boy, you really get going. But when you start talking about how we are going to have enough doctors, scientists, engineers to take on this struggle for the next 25 years, somebody says, "Don't bother me about it." I think guns and rockets have their place, but no one seems to bother about this bigger problem. Maybe they feel we won't have to have any scientists; it will be all over anyhow.

Dr. MEYERHOFF. Well, here in this country, I might add, Senator Humphrey, that we do have several agencies concerned with the count. For example, the Office of Education counts the number of new graduates in engineering and also in science as well as other fields, and so we know how many new ones are coming on.

Senator HUMPHREY. Do they ever say how many we are going to need?

Dr. MEYERHOFF. There is an estimate and the estimate was sponsored by the National Science Foundation and the compiling was done both by BLS and I believe by Dr. Armsby of the Office of Education, and so they have come up with about a 10-year range of needs that are pretty generalized. They are not particularized at all as to field and for that I think we need a great deal more information.

For example, the question arose before as to where we are short of scientists and engineers. I think I can give a fairly accurate idea of that. Numerically, we are shortest in the electronics and mechanical engineering fields. Percentagewise, however, we are more acutely short in the fields of physics and mathematics and—I defer to Dr. Kinzel on this—I should say also on metallurgy.

Now, in the other fields there are shortages, except at the moment in my own field, geology and geophysics, but in all the other fields there are shortages. These, however, are most acute.

Senator HUMPHREY. Thank you very much.

Senator Muskie?

Senator MUSKIE. We, of course, ought to know how many scientists and engineers we have and in what categories of science and engineering. You have indicated that we have done something about spelling out the need. It certainly indicates that we are short.

How do we make up the shortage?

Dr. MEYERHOFF. That, I think, is where an agency on manpower and development could be most helpful.

Senator HUMPHREY. Excuse me. I am going to have to depart, Dr. Meyerhoff. I want to thank you. I have asked Senator Muskie if he would conclude the hearing. I must go to the Senate.

Dr. MEYERHOFF. All right, sir. Thank you very much.

Senator HUMPHREY. Go right ahead. You have the best man to interrogate you here.

Senator MUSKIE. We were talking about how to make up the shortages, Dr. Meyerhoff.

Dr. MEYERHOFF. An agency I believe could do several things. One of them would be to analyze potential needs over a longer range period, so that the schools would know where we are going, where our needs reside.

Now, at the moment everyone has a free choice. We want them to have that free choice. We don't want to regiment any of our students into any particular fields. But on the other hand it has become very evident that the choice of profession by our students is usually determined by the temporary economic situation. There is no one to correct that. We get them flocking into certain fields and avoiding others even though it may be against future trends within those professions.

I think there a great deal of guidance could be effectively provided.

We also need what I trust the National Defense Education Act of 1958 will partially give us and that is better training for the young people who are going into engineering and science.

In our engineering schools, for example, last year there was a 46 percent mortality—46 percent of the people who started as freshman

do not finish and get their degrees. A substantial amount of that mortality results from inadequate preparation in precollege studies in the high schools, and preparatory schools.

There we need a great deal of strength imparted, particularly in the instruction and also in the curriculum.

Now, that might not be the particular function of the agency I have in mind, but at least it could point the need and then work with the proper agency for that function in implementing it.

Senator MUSKIE. Let me ask this rather general question.

We have all kinds of shortages on manpower not only in the field of science and technology, but also teachers, doctors, and psychiatrists.

Dr. MEYERHOFF. Management too.

Senator MUSKIE. Of course, one of our efforts should be to develop the undeveloped and untrained young people we now have and this requires improvement of our education processes and our programs. This requires effective guidance and the provision of incentives. Aren't we going to reach the point where these incentives are going to operate simply to shift manpower from one field to another, rather than meeting the needs of all?

Dr. MEYERHOFF. The competition is good. I never want to destroy it.

Senator MUSKIE. I am not suggesting that.

Dr. MEYERHOFF. Yes, I know you are not.

In the long run, there have been shifts caused mostly by economic promise, better salaries, but nonetheless, those shifts may prove to be extremely unfortunate in any given time.

I have made a statement, and I am ready to stand on it, that if we could reduce substantially, say by 50 percent, the dropout of students from our schools of engineering and departments of science, we would have no problem of shortage at all.

Now, these men, you see, have been accepted as students. They presumably have the qualifications. They register in these subjects. Presumably they had the interest, the motivation, but many of them drop out because they lack the mathematics, they lack the basic subjects. They even lack English. There has been this default of education in the lower level that I think, if corrected, would assist us materially in getting the high level manpower we need, not alone in science and engineering, but also in the legal profession, in the diplomatic service, in the managerial skills, and practically everywhere else.

We are losing too many people because of the dropouts. The flunkouts, particularly, are out altogether. They cannot continue a college career except in a fourth-rate institution.

Senator MUSKIE. One of the ironies of our time, it seems to me, is that while we are concerned currently with the fact that there are more than 4 million people unemployed, there is plenty of work to be done, as we have seen here this morning. It seems to me there is enough work to keep all Americans busy.

Dr. MEYERHOFF. Right.

Senator MUSKIE. There is something wrong with our educational system or with our support of our educational system that we aren't making better use of manpower. This 4 million unemployed, if there

were any effective way of adapting them to the necessary skills; it could make a substantial contribution to our whole economy and also make up perhaps for the shortages about which you are speaking.

Dr. MEYERHOFF. Yes, sir.

Senator MUSKIE. I have no more questions, Dr. Meyerhoff. I would like to say I have appreciated your testimony.

Dr. MEYERHOFF. Thank you. I have appreciated the opportunity to give it, sir.

Senator MUSKIE. We have one more witness this morning, Dr. Eugene Guth, technical adviser to the Director of the Oak Ridge National Laboratory.

STATEMENT OF DR. EUGENE GUTH, TECHNICAL ADVISER TO THE DIRECTOR, OAK RIDGE NATIONAL LABORATORY

Dr. GUTH. Mr. Chairman, I appreciate the opportunity to be here and give some of my ideas about the Government's role in science and technology.

The Government's role in science and technology grew after the last war like Topsy. Remarkable progress has been made in spite of the shortcomings of the whole approach. However, the challenge of a technological race by the eastern bloc was not recognized. Little was done to bring our own scientific resources to maximum development with a minimum of waste, duplication, and bureaucratic red-tape. Russia's development of an A-bomb should have awakened us. It did insofar as it led to our development of an H-bomb, but in other respects we fell back into a slumber. Russia's development of an H-bomb right on the heels of our development should have jolted us into action. It didn't. The first Geneva conference on the peaceful use of atomic energy clearly showed that the Russians have almost caught up with us in atomic energy. It should have jarred us out of our complacency. It didn't. The Russians announced their plans for a satellite. We didn't believe them. Finally, the orbiting Sputnik shocked and awakened us.

The distinguished scientist, Dr. L. V. Berkner, commented on the progress made since Sputnik, his comments are described in appendix D, Senate Report No. 120. It would be a waste of time and duplication of effort to repeat his enumeration, since it has been just published in "Science," March 27, 1959, under the title "Government Sponsorship of Scientific Research," with the subtitle "A Cabinet-Level Department of Science Could Serve To Develop Support for Neglected Areas of Research." This brings me to my first recommendation. I am wholeheartedly in support of Dr. Berkner's suggestion for the establishment of a Department of Science and Technology for support of neglected areas of research. I am also in agreement with him about the tentative divisional setup he suggests. However, I suggest that NSF and NASA be included in the department right from the beginning—or at least shortly thereafter.

I may add that I am also in favor of including at least part of the Smithsonian Institution.

Moreover, I suggest plans be made now so that within, say, a couple of years, we could include all the agencies enumerated by the distin-

guished scientist, Dr. Wallace R. Brode. His comments are included in Senate Document No. 90, page 20.

I should like to add now to my prepared comments in view of the discussion this morning.

I think Dr. Berkner in his comments made an enumeration of the agencies which he says are not in any functional relationship to the departments in which they are contained now and which happen to be in the particular departments out of accident or out of historical development. It seems to me that transfer of these agencies to a new department would lead to less controversy and it would perhaps be a good beginning.

Now, I should like to make another suggestion with regard to comments made by Dr. Kinzel and Mr. Emery concerning the creation of a commission or committee to study these questions, in particular just which agencies should be transferred.

It seems to me that Dr. Berkner and Dr. Brode—Dr. Brode is in Government service and is now adviser to the State Department, and Dr. Berkner has been very close to Government service—have made a very careful study of the whole problem and it seems to me that their suggestions could be used as a basis. There seems to be no point in starting from scratch and go over matter which has already been discussed in great detail.

The distinguished admiral and engineer, H. G. Rickover, in his recent book, "Education and Freedom," Dutton, New York, 1959, painted in eloquent words an extremely serious picture of the world today. If we believe him and there is absolutely no reason why we should not, we are at war in a terrific struggle for the survival of all that is dear to us. Then, the establishment of another agency is not enough. We have to establish a proper spirit and atmosphere in which our science and technology can grow.

For every important field of science and technology of national importance there should be a national laboratory established if suitable scientific and engineering manpower is available. Such laboratories should be run by the central laboratory management. By that I mean that laboratory management should decide what is going to happen in detail in the laboratory and the supervising bodies in Washington should just determine the overall strategy, but not the tactics.

Funds should be allocated on a long-term, not fiscal year, basis to the laboratory as a whole, not to specific programs. These laboratories should enter into contracts with universities for help in their basic research and with industry for help in applied research including the building of large-scale equipment. Conversely, the national laboratories thus will help both universities and industry.

I should like to make one item more precise here than it is contained in my prepared statement.

Long-term operation should refer mostly to basic research. Applied research, including both defense and civilian research and development, should be reviewed year by year.

Year by year billions of dollars are wasted by continuation of contracts which should have been terminated. One hears from agencies the statement, "It took us 2 years to decide to start this contract. Now, we cannot in a few months decide to terminate it." Here is a real bottleneck and billions of dollars could be saved on the basis of judicious reviewing of all big contracts.

We should very seriously consider "bloc grant-type" long-term—5 years at least—support of university research by the Government. The year by year piecemeal support of projects leads to uncertainty, waste, and duplication. It is true that some agencies gave 2-year and sometimes even 3-year contracts for projects to universities, but this is not enough. If a scientist is unable to convince his own university of the importance of his research, then, usually, his research is not worthwhile. There are a few exceptions, but they do not justify the setup of competing agencies, so that scientists if refused money by one agency can shop around for support from the other agencies.

The bloc-type grant is practiced with great success in England. It is descirbed in a recent article—Science, March 13, 1959, by Dr. E. S. Hiscocks, the distinguished director of the United Kingdom scientific mission and scientific attaché of the Brtish Embassy, Washington, D.C. It is discussed in relation to the United States by the distinguished Harvard dean, Don K. Price. He does not believe that it fits the American scene. I beg to differ with Dean Price on this point. I am sure that both universities and appropriations subcommittees will be willing to give up time-honored procedures and prerogatives which are as obsolete in the 20th century as Aristotelian physics. We cannot afford to wait and to see whether our old procedures—that is life as usual regardless of the threat of the eastern bloc—will suffice. We cannot afford to give the eastern bloc a chance to overtake us. I am sure that this distinguished subcommittee for once will put the essentials of democracy over its frills. And time-honored, but obsolete, procedures are frills.

Dr. E. S. Hiscocks suggested, and Dean Don K. Price agreed with him, that in many ways an ideal pattern would be somewhere between the British and American extremes for Government support of science. Why not strive for such an ideal pattern? As befits a younger nation, U.S. scientific policy should be more flexible than the British policy, in spite of the fact that we do have a written Constitution and the British have not.

We need large-scale efforts by large teams to build a reactor or to study the effects of radiation on mice and men. However, it is the individual who gets new ideas which lead to new discoveries and inventions. Coodination and organization are a means to an end, not the end itself. The organization has to be fitted to the individuals rather than the individuals to the organization. Therefore, I was happy to see that distinguished representatives of the engineering and of the scientific manpower commissions will testify today before this distinguished committee. In the fall of 1955, I set up a brief emergency plan for relieving shortage of scientific manpower and an emergency plan for better utilization of scientific manpower in Government research.

May I ask that these should be made part of the proceedings of this committee.

Senator MUSKIE. Yes. We will make those reports part of the committee's files.

Dr. GUTH. Thank you.

After the First Geneva Conference the British magazine Research published an editorial on the "Atomic Energy Race." I quote:

> The Conference has given a unique opportunity of comparing the relative progress made by different countries. Clearly, the United States with its im-

measurable greater resources that Britain and other European countries is in the lead. But as is commonly the case with American scientific investigation, developments have been diffuse and rather lacking in touches of individual inspiration.

Of course, we could come back at our British cousins and point out the obsolete character of a lot of their industry in comparison with ours. Still, this does not cancel their criticism. The Second Geneva Conference has been characterized by fission, fusion, confusion. Let us hope that in the United States there will be more fission and fusion and less confusion with regard to science and technology and engineering.

I appreciate the opportunity to discuss these items before the subcommittee.

Senator MUSKIE. Thank you.

I think it might be useful if we had in the record a little more information about your own background and your present occupation.

Dr. GUTH. Mr. Chairman, I shall be glad to give you more information on this point.

I came to this country in 1937 to the University of Notre Dame and there I had headed the problem on how to organize science in a school which offered good undergraduate training but had a very small graduate school.

After the war I became research professor of physics at Notre Dame and helped them organize science by bringing in, for instance, a new head in mathematics and a new head in chemistry and strengthening the department of physics.

During the war I was in charge of projects with the Office of the Rubber Director and later on I was director of a project with the Armstrong Cork Co., and of another project with General Tire Co.

I have also been a consultant to Standard Oil of New Jersey, to the Rand Corp., and to Purdue University.

So I have had considerable experience at various levels of research and teaching, and I have thought a great deal about organization of science ever since I came to this country.

Senator MUSKIE. And you are now technical adviser to the Director of the Oak Ridge National Laboratory?

Dr. GUTH. That is correct.

Senator MUSKIE. What is the nature of your work presently?

Dr. GUTH. I have an overall interest in what goes on in the Laboratory. The Director asks me to give him advice on technical problems. For instance, I am on the Steering Committee of the Oak Ridge fusion project. In addition, I continue to do basic research in physics.

Senator MUSKIE. I notice in the prepared text of your statement that you said the First Geneva Conference on the Peaceful Uses of Atomic Energy clearly showed that the Russians caught up with us, and you changed that to "almost."

Dr. GUTH. Almost; not quite.

Of course, it is very hard to tell from the printed communications of the Russians whether they caught up with us or not because they are, as you probably know, very cagey and it is not clear just how far they are. Once in a while we see an indication; for instance, with the Sputnik that they got ahead of us.

I should like to refer to a statement made just last October by Sir John Cockroft, who visited Russia after the Second Geneva Conference. With regard to the thermonuclear work, he mentioned that Russia is just about on a par with the United States and Britain but they work at a much faster rate. He made the statement that they work at a rate two or three times as fast as we do.

So a statement about catching up is perhaps not as important as the rate. The Russians seem to work at a very high rate.

Maybe since you brought up the Russians, Mr. Chairman, I should add another comment.

You see the reduction basic research is guided in general by their academy of science.

We see in newspapers that the president of the academy, A. A. Nesmeyanov, a chemist, directs Russian science. We know that no single man can direct Russian science, which in our money is probably a $4 billion project or larger, but you may be interested that apparently a large number of the members of the Russian Academy of Science are not Communists and it is questionable that Nesmeyanov is a Communist. I don't have any data on that, whether he is or not, but I rather think he is not, because, for instance, he criticized Khrushchev's latest directive with regard to Russian education. However, the secretary of the academy, A. V. Topchiev, is a Communist. He is also a chemist. He was just recently elected vice president of that organization.

The only thing of interest for us in this connection is that it is possible to have one big central science organization because the Russians did make great strides after the war.

Senator MUSKIE. At this point—I was interested in your statement that for every important field of science and technology of national importance there should be a national laboratory established.

You say this in terms of the proposed new Department of Science and Technology, that it should contain under its jurisdiction a central——

Dr. GUTH. This is a suggestion which is somewhat independent of the establishment of a new department. Small-scale research can be done in universities or in small private organizations but for large-scale research and development, like for instance building a reactor or the type of work going on in the National Institutes of Health, one needs a national institute, because no school can moneywise. And no industrial organization is willing to take a risk for a large-scale effort unless there is a short-term return in sight.

We have some very important large-scale research, for instance, in problems like meteorology. We hope there will be large returns but it is not obvious that we will have it on a short-term basis.

Senator MUSKIE. Speaking of laboratories, they are planned or directed by Government employees, these national laboratories?

Dr. GUTH. Not directly. The present national laboratories are operated for the Government by universities or companies, industrial on cost-plus basis. The management of the laboratories has a certain amount of freedom.

Senator MUSKIE. That is the arrangement that you——

Dr. GUTH. On organizational matters they are responsible to universities or companies but not directly to the Government.

Senator MUSKIE. You are not advocating a Government laboratory? You are advocating simply that the Government utilize the services of industry and universities?

Dr. GUTH. Yes.

I am not in favor of establishing more and more Government laboratories as long as we don't modify the civil service because I know by experience that a lot of scientists hesitate to go into Government service because of the civil service regulations.

Senator MUSKIE. So Government would serve the role of coordinating the laboratory efforts in our universities and industries?

Dr. GUTH. Yes. I think this would be a better utilization of our present organizational setup and it would introduce less redtape. You see we certainly need a deflation in redtape in order that science survive.

Senator MUSKIE. Thank you very much, Dr. Guth, for your testimony.

Dr. GUTH. Thank you, Mr. Chairman.

Senator MUSKIE. This concludes the hearings this morning.

We will convene at 2 this afternoon.

(Thereupon, at 12:40 p.m., the hearing was recessed to reconvene at 2 p.m., the same day.)

AFTERNOON SESSION

Senator HUMPHREY. The subcommittee will come to order.

Mr. Secretary, first of all, a word of apology to you for keeping you waiting. We had a live quorum over in the Senate, and I just had to stay there until I could get released.

Senator Gruening is expected to be here momentarily. Senator Muskie was called upon to go downtown to address the editors and publishers.

We want to thank you very much for your willingness to appear and discuss with us the proposal before the subcommittee, S. 676.

Will you please proceed as you see fit.

STATEMENT OF HON. LEWIS L. STRAUSS, SECRETARY OF COMMERCE

Secretary STRAUSS. You are very courteous, Mr. Chairman. I know how these social occasions interfere with business. You and I were on one a couple of days ago at lunch.

Senator HUMPHREY. Right.

Secretary STRAUSS. Which probably cut into your afternoon as it did into mine.

Senator HUMPHREY. It did indeed.

Secretary STRAUSS. Mr. Chairman, I have a brief statement which, with your permission, I should like to read.

Senator HUMPHREY. Please do.

Secretary STRAUSS. I appreciate this opportunity to appear before you to discuss the proposal to establish a Department of Science and Technology. It is my understanding that S. 676, the bill you are now considering, would transfer to a new executive department the National Science Foundation, the Atomic Energy Commission, the National Aeronautics and Space Administration, the National Bureau of Standards (the radio and cryogenic laboratories at Boulder, Colo.,

would be a separate component of the proposed Department), and the scientific research functions now lodged in the Smithsonian Institution.

Senate Report No. 120, issued in connection with S. 676, emphasizes that the bill does not necessarily represent the individual views of its sponsors but that—

> The basic objective in submitting the bill to the Senate is to afford a medium for initiating positive action toward improving the status of science and scientists, both within and outside of the Federal Government, to accord with the increased importance of science to the safety of the Nation and the advancement of peace.

I am in fullest accord with the basic objectives.

I do not believe that the establishment of a Department of Science would contribute to these objectives nor that it would serve the best interests of efficient organization of the scientific and technological activities of the Government. The Department of Commerce urges that S. 676 be not enacted.

I will undertake to state the reasons which have led to that conclusion, Mr. Chairman.

Science has always been important to the growth and security of our Nation. Evidence of the recognition of this may be found at every stage of our history. From our earliest days, with the establishment of the patent system in 1790 and the organization of the Coast and Geodetic Survey in 1807 to the more recent developments in the fields of nuclear research and space technology, our Government has encouraged and supported science. Important scientific activities have been carried on for years in the Departments of Agriculture, Defense, Interior, Health, Education, and Welfare; and, of course, Commerce. Scientific research or the support of scientific activity is the major concern of a number of our important newer independent agencies such as the National Science Foundation, the Atomic Energy Commission, the National Aeronautics and Space Administration, and others.

Today, more than ever before, we have an acute public awareness of the importance of science to our national defense, our national economy, and the everyday well-being of our citizens. A good part of this awakening must be attributed to the realization of the spectacular advances made in certain fields by scientists in the Communist countries. To a large degree, this recent awareness has been coupled with concern over the extent to which our own scientific efforts are adequate to the growing demands of the present and sufficient to meet the outstanding challenges of the future, of which the Communist challenge is preeminent.

I might interpolate in my statement here, Senator, that as long ago as November 1955, which, shall we say, was 2 years pre-Sputnik, in an address to the Edison Foundation Institute, I called attention to the inadequacies in our scientific education system as compared with the Soviet system and produced figures to substantiate my concern.

Senator HUMPHREY. What was that date again?

Secretary STRAUSS. The date was November 21, 1955. And I have brought a copy with me in the event that you might care to see it.

Senator HUMPHREY. Yes. We will make it a matter of reference

in the hearing, because I think that it is important that that be noted.[1]

Secretary STRAUSS. Thank you, Senator.

We have been going through a period of intense and healthy self-appraisal. The results have been encouraging. We have rediscovered, after some initial misgivings, that U.S. science has grown to a position of world leadership. With this has come the realization that there will always be much to be done if we are to maintain and improve the quality of our scientific work.

The idea of establishing a separate department of science in the Government to which could be entrusted the responsibility for meeting our science needs is, I understand, not new. Its advocates, however, tend to overlook or minimize the real purpose of science and its place in our society.

In my opinion, after 20 years of working with scientists in Government, and in private research for a number of years before that, I am convinced that science does not lend itself naturally to consolidation or isolation within one organization. Science is a necessary and vital aspect of all our Government and all our economy. It is inseparable from the work of charting our coasts, forecasting our weather, providing standards for measurement, assuring the wholesomeness of our food, the expansion of our industry, the reliability and safety of our transport, the strength of our Nation's defenses, and the health of our growing population. These are by no means all of the functions to which science contributes.

Those seeking to advance science by grouping all or most scientific research into one department could defeat their purpose in the long run, or so it seems to me. A department of science, rather than advancing scientific research, might well tend to isolate from science the daily conduct of public affairs and thus interfere with the cross-fertilization of ideas and the diffusion of scientific doctrine and method among the various departments and agencies whose functions and responsibilities ought to be usefully served with a scientific approach.

On March 13, 1959, when President Eisenhower signed the Executive order establishing the Federal Council for Science and Technology, he said:

> By fostering greater cooperation among Federal agencies in planning their research and development programs, by facilitating the resolution of common problems, and by reviewing the impatc of Government policies on the programs of nongovernmental institutions, the Council should be able to contribute greatly to the development and advancement of our national programs in these important critical areas.

The Council consists of representatives of the Departments of Defense, Interior, Agriculture, Commerce, Health, Education, and Welfare; the Director of the National Science Foundation; the Administrator of the National Aeronautics and Space Administration; and the Chairman, or another member of the Atomic Energy Commission. Representatives of the Secretary of State and the Director of the Bureau of the Budget will participate as observers. In addition, the Chairman of the Council may invite others to attend meetings when appropriate.

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[1] On file with the committee.

I have undertaken to represent the Department of Commerce in the important work of the Council. Dr. Allen V. Astin, the Director of the National Bureau of Standards, will serve as my alternate. The Council will be in an exceptionally good position to deal with major government science programs and to assure the maximum coordination of effort to the end that we may realize the greatest possible progress from our total scientific activity.

Effective coordination is not all the effort which is needed to assure the continued progress of our science. We also need to be certain that the agencies engaged in work of a scientific and technological nature are adequate to meet our expanding national needs. To this end, the Department of Commerce has asked the National Academy of Sciences, a body independent of the Government but chartered by the Government, to undertake an up-to-date evaluation of our technical agencies.

Senator HUMPHREY. When was the request made.

Secretary STRAUSS. During 1958. And the report is shortly to be made.

Senator HUMPHREY. I see.

Secretary STRAUSS. The National Academy has accepted this task and a committee of distinguished scientists under the direction of Dr. Mervin J. Kelly, past president of the Bell Telephone Laboratories, is currently engaged in studying the operations of the Weather Bureau, Coast and Geodetic Survey, National Bureau of Standards, Patent Office, Office of Technical Services, Bureau of Public Roads and Maritime Administration. The committee's study is designed to determine the requirements of science and industry for services of the type the Department of Commerce can provide, new or improved means of meeting these requirements, and methods of relating the Department's programs to the improving techniques afforded by scientific and technological progress. The committee report is expected to be ready in the late spring or early summer. We will study their report and recommend actions carefully and take whatever action may be needed to strengthen the science programs which are the responsibility of our Department.

I would offer for the record here, Mr. Chairman, the list of the members of Dr. Kelly's committee, unless you wish to have me read it.

Senator HUMPHREY. That is the membership of the committee studying the technical operations at the request of the Department of Commerce at your request?

Secretary STRAUSS. That is right, sir.

Senator HUMPHREY. Thank you.

Secretary STRAUSS. It is a list of very distinguished names.

Senator HUMPHREY. We will make that a part of the record at this point.

(The list of members of the special advisory committee to the Department of Commerce is as follows:)

SPECIAL ADVISORY COMMITTEE TO THE DEPARTMENT OF COMMERCE

Dr. Mervin J. Kelly (retired president of Bell Telephone Laboratory), Chairman.

Prof. Horace R. Byers, department of meteorology, University of Chicago.

Dr. H. A. Leedy, Armour Research Foundation, Illinois Institute of Technology, Chicago.

Dr. C. Guy Suits, vice president and director of research, General Electric Co. Research Laboratories, Schenectady, N.Y.
Prof. Abel Wolman, the Johns Hopkins University, Baltimore.
Dr. Augustus Kinzel, vice president (research), Union Carbide Corp., New York City.
Dr. Michael Ference, Jr., director of engineering staff, Ford Motor Co., Dearborn, Mich.
Frank W. Herring, deputy director for comprehensive planning, New York Port Authority, New York City.
Dr. Paul M. Fye, director, Woods Hole Oceanographic Institute, Woods Hole, Mass.
Dr. Dale F. Leipper, department of oceanography and meteorology, Texas A. & M. University.
John C. Green, director, Office of Technical Services, Department of Commerce, Executive Secretary.

Secretary STRAUSS. In our preoccupation with science and scientific needs, it is important that we maintain a proper perspective, particularly as between the newer and more glamorous areas of science and the more familiar areas. In recent years we have created a number of new agencies and these have been generously endowed with funds and freedom to pursue their work. As a consequence, some of the older agencies, whose importance has by no means been diminished by the passage of time, are handicapped in the availability of funds and the freedom to recruit personnel and fix adequately attractive salaries. More than any reorganization, there is the need to maintain and expand the effectiveness of the organizations we already have and which have served the Nation so well in the past.

One thing more I should like to mention before closing. S. 676 proposes to separate the Boulder Laboratories from the National Bureau of Standards. This proposal does not indicate appreciation of the mission and program content of these laboratories. Although a case might be made for separation of the Cryogenic Engineering Laboratory and the Central Radio Propagation Laboratory, it would be a serious mistake to separate the Radio Standards Laboratory from the National Bureau of Standards. This laboratory contributes directly to the most basic mission of the Bureau of Standards—the establishment of the standards for physical measurement. Its activities are also closely related to other measurement standards problems of the Bureau. If this program were separated from the Bureau, many difficult and unnecessary problems of program management and coordination would be created.

We must do a great deal if we are maintain and improve the quality of our scientific and technological endeavors. This problem is continuous and can best be met in an atmosphere of thorough understanding of all aspects of our national needs which are affected by science. Science should continue to permeate the entire structure of our Government and not be insulated from it. It cannot be rigidly departmentalized save at great sacrifice. S. 676, since it proposes no more than the consolidation of a group of relatively disparate activities into a new department, can accomplish little if anything toward solving any of our existing problems in science or assuring our future progress. We are, therefore, Mr. Chairman, opposed to its enactment.

Thank you.

Senator HUMPHREY. Thank you very much, Mr. Secretary.

I wanted to ask just one or two questions of general information.

How much authority does the Federal Council for Science and Technology—to which you alluded and gave a brief description on the basis of the Executive order—have to really coordinate programs?

Secretary STRAUSS. The Executive order spells out the status of the Council, Mr. Chairman; and I presume that it would exercise its influence as a coordinating body through the established agencies and the heads of the agencies, which are the components of the Council, rather than that it would issue any directives itself.

Senator HUMPHREY. I notice the language of the Presidential order, and at least that part which you quoted, is rather general. It says:

The Council should be able to contribute greatly to the development and advancement of our national programs in these important and critical areas.

It starts out by saying:

By fostering greater cooperation among Federal agencies.

Now, it appears that the order itself really merely establishes the Federal Council, and relies upon the interplay of the members of the Federal Council to try to bring about better coordination.

Secretary STRAUSS. That is right.

Senator HUMPHREY. And their general consensus as to what ought to be done would be the driving or the effective instrument or force.

Secretary STRAUSS. But there is one other aspect of it, Senator. I am reading now from the language of the Executive order, section II, subparagraph (b):

The Council shall consider and recommend measures for the effective implementation of Federal policies concerning the administration and conduct of Federal programs in science and technology.

Then section 2(d), it seems to me, indicates the possibility that there might be disagreement between the members. That reads:

The Chairman shall from time to time submit to the President such of the Council's recommendations or reports as require the attention of the President by reason of their importance or character.

This, it seems to me, provides a means for the opinions of the Council in effect to override, where the President's concurrence is obtained, the views of a separate individual department.

Senator HUMPHREY. Well, at best that is rather foggy. I appreciate that subsection 2(d) provides that the Council may submit or shall submit to the President such of the Council's recommendations or reports as require the attention of the President. But what I am getting at is that if there happens to be some conflict of priority on research programs, or where there is a limited number of personnel for a particular type of endeavor, one or more or two or more agencies are competing for said personnel, then it appears that the Council at best has advisory or consultative or mediatory powers. I mean powers of mediation, but may not issue any direct order or regulation.

Is that right?

Secretary STRAUSS. Yes. I think there is a very pertinent and excellent example of the workability of this kind of an arrangement. The fact that there might be conflict between the Atomic Energy Commission, a civilian agency, and the Department of Defense, a military agency, was recognized when the McMahon Act was drawn in 1946. And it was provided in that statute that a military liaison committee and the Commission, which together would be analogous to

this body, could in the event of their inability to agree submit a difference of opinion to the President. As of June 30, 1958—I do not believe that any event has occurred in the interval—in other words, between 1946, when the law was enacted, and currently, I do not believe that there has been but one instance in which a difference of opinion had to be appealed to the President. These things do work as between men who are anxious to get ahead with their jobs.

Then I might instance another thing, Senator. Businesses can only prosper to the extent that they are successful in competing with other businesses. Those businesses which are large enough to be divided into divisions or departments, like, let us say, the Du Pont Co., or General Motors, and where research is an important part of their activities, have, instead of one large research organization, one large scientific organization, operating for the whole enterprise, a research and development organization in each division. This entails some overlapping. It entails some duplication. But they regard that as a small price to pay for the fact that each of their divisions is alive to the scientific possibilities of growth and new ideas. And I do not believe that the Government is a less comprehensive, that indeed it is a far more comprehensive situation, than any of these companies.

Senator HUMPHREY. Who is the Chairman of the Federal Council for Science and Technology?

Secretary STRAUSS. At the present time it is the President's Scientific Adviser, Dr. James R. Killian, Jr.

Senator HUMPHREY. In other words, the same gentleman who is the Chairman of the President's Science Advisory Committee; he is also the Chairman of the Federal Council on Science and Technology—Dr. Killian.

The study you requested by the National Academy of Sciences to which you referred in your testimony, relates only to the activities of the Department of Commerce, as I understand it.

Secretary STRAUSS. That is right, sir. It is not to be a continuing committee. It is the sort of review or audit that is conducted from the outside that I think is beneficial in any organization.

Senator HUMPHREY. We had suggestions this morning, Mr. Secretary, that this whole problem of the coordination—and I think it might be proper to say maximization or acceleration of science activities in the Federal Government—might well be reviewed by an impartial commission along the lines of the Hoover Commission formula, providing for a report back to the President and the Congress. That proposed body would consist of representatives of the Scientific Community and members of the executive and legislative branches of the Government. What would be your view as to that?

Secretary STRAUSS. I think it would be an excellent idea, Senator. I am sure you are familiar with this history. But it might be illustrative for the record. During the War Between the States President Lincoln approved the formation of the National Academy of Sciences. It has continued as an independent body of scientists; it is self-perpetuating. It is independent of the Government. And on innumerable occasions it performs very valuable surveys of the sort that you have just mentioned, and would, I think, be competent to perform that kind of service.

In 1955, or it may have been 1956, I requested the National Academy to conduct a study of the effect of radiation from fallout on human beings.

Senator HUMPHREY. Yes, I recall.

Secretary STRAUSS. And it was, therefore, done independently of the Government, the funds were provided by the Rockefeller Foundation, so that both the men who worked on it and the money which supported it was independent of any influence from the executive or legislative branches of the Government, and this report was made public, and I think derived a substantial part of its stature from its impartial nature.

I would say that such a survey as you have recommended– I didn't know that you had recommended it, but as you have indicated—would be a very salutary thing.

Senator HUMPHREY. Do you feel that the National Academy of Sciences itself might undertake a survey of the scope of the entire scientific and technological activities of the Federal Government for the purposes of any contemplated reorganization?

Secretary STRAUSS. I do. And I would say that if you organized it outside of the National Academy of Sciences, you would probably find, in order to obtain men of stature and competence, that you were drawing on the personnel of the National Academy in any event.

Senator HUMPHREY. There is one further question I want to ask with reference to the point you made about the older agencies, which I think is a very solid point, and I am pleased that you made it.

Secretary STRAUSS. Thank you.

Senator HUMPHREY. There is a tendency, because there are problems relating to outer space and all kinds of new things happening, that we concentrate our funds and attention on the newer agencies. They are indeed entitled to that attention, but these older agencies have been at this business a long time, and I am happy that some of our most capable and dedicated Government servants are in some of these agencies.

Secretary STRAUSS. I am happy to hear you say that, Senator. The Weather Bureau, which comes in for a lot of spoofing, and is an old agency, is today growing in importance because of the essentiality of the Weather Bureau, not only to national defense, but to transportation, agriculture, and so forth, and there are a number of agencies like that which have not had adequate support in recent years. And we are dedicated to seeing, with your assistance, that something can be done to ameliorate that situation.

Senator HUMPHREY. Yes, it is a wonderful service. The Coast and Geodetic Survey is another one. I note that you emphasize them, and I think this should be pinpointed.

Another point I was interested in is the salary schedules of the old agencies as relates to the new agencies. There is a discrepancy, is there not?

Secretary STRAUSS. I am not able to give you figures. But there has grown up in the last several years the habit of contracting to private nonprofit institutions work which ordinarily would be done in a Government agency, but which cannot be done that way because the men cannot be paid adequate salaries. And under these contracts, services are obtained which would otherwise be unavailable.

This has produced an inequity, due to the fact that most of this habit of contracting has grown up in the newer and, as I say, the more glamorous agencies. There are men of great competence and devotion in the older agencies who are relatively underpaid.

Senator HUMPHREY. I surely agree.

I notice when we were discussing—and you have been in these discussions too—the whole program of our inspection and detection of nuclear and thermonuclear tests, some of the people in our Government who do this work and make the scientific analyses are really patriots; they do tremendous work; they are entitled to the kind of remuneration and recognition which would come to them if they were in private industry, or even more so. And I do not mean to exclude them from this.

I am pleased that you, sir, as a responsible head of a Department, would take the time out in your statement to make this comment. It ought to be a very helpful one to many others.

Mr. Secretary, I am going to turn the questioning over to Senator Gruening. I indicated to you before that, unbeknownst to me because of the unpredictability of Senate schedules, I must return to the Senate floor. Senator Gruening is a much better interrogator than I am, anyhow, and he is a doctor; he is a scientist in his own right, and at best I am just a druggist, and that does not put me in the same echelon as Dr. Gruening.

Senator GRUENING. His prescriptions have been very much in the national interest.

Senator HUMPHREY. Mr. Baker will be the next witness, and maybe I will be back in time to hear his testimony.

Thank you, Mr. Secretary.

Secretary STRAUSS. Thank you.

Senator GRUENING. I have one or two questions.

I think it is clear from the statement of the chairman that these hearings on this bill are in the nature of an exploratory operation. The best way to get expert opinion just as the best way to get a decision from the Supreme Court, is to bring an action. And the best way to find out how we can promote the many interests that are involved in science and how the great need for the better utilization of science may be satisfied is by just such hearings on a proposed piece of legislation.

It is not my idea, as a cosponsor of the bill, that there is before this committee anything closely approaching a final draft for what may ultimately create a Department of Science. What we hope to arrive at, if we can by such hearings, is how we can best mobilize and usefully use the many new aspects of science that are developing, not merely in connection with our critical world situation, but for our domestic uses.

Now, I too was very much interested in your comments about the apparent fiscal discrimination between the older agencies and the newer ones. And that also comes home to one of the functions of this Committee on Government Operations. And I would like to ask you respectfully, by way of illustration: When you present a departmental budget to the President, and you ask what your Department needs, are you cut down substantially in that budget when it is approved by the administration?

Secretary STRAUSS. This not a question of the budget, Senator Gruening. The question of pay of individual grades does not enter in. The pay of individual grades is fixed by statute, and budget requests could not increase the salary of an individual by so much as a dollar, as far as I am informed.

What has happened is this: Over the years, the realization by business that science is important to its health, and which has meant, for example, in some of the large chemical industries, that the bulk of the products that they sell today were not even known to them 20 years ago, and this has occasioned a great competition for many of training and skill and ingenuity, and this competition has made it necessary for those concerns which wish to hire them to pay for them. This has left Government salaries far behind. It has made it necessary to recruit in the Government men whose devotion to public service or to the sort of security that lengthy service in the Government provides; it has restricted it to a very much smaller selection of men. And to that extent, in my opinion, it has handicapped the Government.

I would hope that one of the things that might result from the creation of this Council which the President has already established would be a recommendation to the Congress—in any event, it will certainly be a recommendation of mine to the Council—that an increase in the number of higher grades of employees be made available to these agencies.

This, sir, would only involve the budget to the extent that, after that legislation was enacted, that a multiplication of dollars resulted in a change in the total for a specific activity.

Senator GRUENING. Do these newer agencies, as you see it, get more money because they are newer agencies?

Secretary STRAUSS. They get part of it for glamor, they get part of it because, let us say, they contract with a university or a nonprofit research organization for a piece of work in which the out-of-pocket expenses of the contractor are included, and those out-of-pocket expenses include salaries substantially above the Government pay levels.

Senator GRUENING. Do you think it is a matter for congressional legislation?

Secretary STRAUSS. I think, Senator, that all methods of approach should be considered before legislation is asked for. And I am inclined to believe that is the way it will eventually be solved, is by legislation.

Senator GRUENING. Well, I am very much in sympathy with your idea that the professionally trained personnel should be paid far more adequately than they are now. And it is quite true that many men of great talent are retained in the Government for no other reason than their love of the work and their devotion to it, and frequently their economy and their family's economy suffer in consequence. And that is a situation we should try to rectify.

Now, on the matter of a new department, of course it is obvious that whenever a new department is created which absorbs to itself parts of other agencies, there is a good deal of opposition. And yet that process has gone on, somewhat gradually, and it is bound to go on as knowledge multiplies and the field of human activities becomes more diversified.

Go back a half a century when the Department of Labor was created by cutting off Labor from Commerce. And far more recently, we have the Department of Health, Education, and Welfare. Certainly no one would criticize that, although it took Education from Interior and it took in the Federal Security Agency and various other functions from other agencies.

It seems to me that somewhere along the line we will have to pay a little more attention to coordinating the diverse aspects of science. Although important scientific work is carried on by almost every Department, as I pointed out, it is carried on in your Department by the Weather Bureau, Coast and Geodetic Survey, and I suppose to an extent in the Patent Office.

Secretary STRAUSS. The Bureau of Standards and many places.

Senator GRUENING. And I suppose that is true in the Department of Defense.

What this committee is hopeful of finding out is how we can best promote scientific research and utilize the results of scientific research. That is what these hearings are for. I hope that in the course of these hearings we will get valuable suggestions. And I hope that in addition to your very fine statement, if you or members of your Department have any further constructive or destructive suggestions to make, that they will be presented.

Secretary STRAUSS. Thank you.

Senator GRUENING. I have no further questions. Thank you very much, Mr. Secretary.

Secretary STRAUSS. Thank you very much, Senator Gruening.

Senator GRUENING. Mr. Baker is next.

You may proceed, Mr. Baker. I understand that you do not have a prepared statement, which means that we will pay more close attention to what you have to say.

STATEMENT OF DR. W. O. BAKER, VICE PRESIDENT—RESEARCH, BELL TELEPHONE LABORATORIES, MURRAY HILL, N.J.

Dr. BAKER. Thank you, Senator Gruening.

I would only like to reflect a little bit on science in a small way, compared to very much larger reflection that Secretary Strauss and his associates could give, since I am just an individual worker in the field, plus, to some degree, representative of a part of the scientific community.

The community of scientists and engineers is grateful for an extended opportunity to discuss ways of strengthening our national position, and it seems to me that your committee, in its various comprehensive reports on the relations between our Government and science, has recognized an interesting duality in the program. First, of course, has been alert attention to the proper Federal support of these scientific and technological activities. But, in addition, there has been a willingness to see that understanding of science and technology in their relation to the modern welfare of the state and of the individual is concerned in the committee work.

This later issue, which is somewhat philosophical, might turn out to be a principal aspect of your present hearings. That is, S. 676 raises the fundamental distinction between a means to an end and an end in itself.

It could be said that science and basic scientific research and some parts of technology are means; they are means to produce knowledge and discoveries which will then cause, through imaginative development and vigorous engineering, the final acquisition for the public benefit of the products and services, and of the defenses and the comforts which we all associate with the technological era. We know that these ends, such as antibiotics, television, telephony, and nuclear-powered submarines and wash-and-wear attire, all started with basic scientific research, but in order to appear in a form useful and effective for our Nation, they had to go through a long and busy history of development—engineering, manufacture, financing, merchandising, and designing and redesigning. Eventually some of them reached such economic maturity that they could even be sold with no down-payment!

This is a long way from their beginning in a test tube or towing tank. And in the long and tortuous route from test tube to a testimonial, science has had charge for only part of the way, and development and engineering for a good deal more of it, but still for minor parts.

And the thing that puts the end product through is some form of operations. In industry these may be manufacturing and merchandising and financing. And specifically for our issue this afternoon, in Government they may be contracting and procurement, and ultimately organizing for use or, as examples, to stimulate use by parts of the population.

Therefore, science and technology are usually a part of any business or Government operations. They are not separate operations themselves.

So I am just trying to emphasize, as an individual scientist, that most scientific and technical functions in the Federal Government make a vital contribution to the overall operations concerned with a particular part of the Government.

This relationship is most obvious in the Department of Defense, partly through its preeminent position and the size of its research and development programs, as well as the spectacular character of its end product. But also by the Bureau of Standards, which is properly identified in S. 676 as one of the important scientific agencies in the total Government program, a strength and style are given to a wide variety of Commerce Department operations, despite an often loose relationship between the National Bureau of Standards and those operations.

Many of us believe that these relationships must become closer and stronger in the coming years, and then, of course, the direct contribution of the Bureau of Standards to overall Commerce Department operations would become even larger than now.

It may, of course, be noted that the specific agencies proposed to comprise a Department of Science and Technology in S. 676 presently are, besides the National Bureau of Standards, the National Science Foundation, the Atomic Energy Commission, and the National Aeronautics and Space Administration. These are less integrated into end operations than many of the older scientific and technical groups.

I think this bears on the problems of philosophy of science and technology which we mentioned earlier. This very fact that they are

independent of executive departments and the circumstances under which these agencies have grown, mean that they yield a very special, particular kind of service. They do not represent ends, but services presenting highly specialized and difficult means to ends.

In the National Science Foundation, this may be regarded as the concept of basic research being a service. As such, it is of great importance to all operating agencies. NSF sets an intellectual style and tone for education, for industry, for public health, and for science and technology devoted to the national security. Would this status be as effective if it were one of a group of agencies collected in a new department?

Once more, however, NSF does not produce end results directly distributed to all the population such as in the Post Office Department or the Commerce Department. Those very directly and routinely do. Similarly, the Atomic Energy Commission appears to perform a research and engineering service from the point of view of the scientific and technical communities, of the highest quality to those parts of our national program concerned with new and growing exploitation of nuclear energy. But it may not be destined to operate all the reactions in the Nation.

It appears that the fluidity, the ability of these special services to adjust to the very rapid change to which they are subject, means that they have somewhat different organizational need than an executive department, which can stabilize its operations right through to an end product.

Science and technology lose their freedom to seek alternatives, and to base judgments completely on national laws, and to ignore the subjective resistance to change of mankind and his society when they are too much dominated by operational and application needs.

Now, of course, this very fundamental argument can be turned around to say that that is just why something like the Bureau of Standards is overwhelmed by the other operational activities of its executive department. It is then said that the science and technology of the Bureau of Standards would flourish better further away from operations. We believe this is not the case, speaking for many scientists and as a member of that community, because we believe that the operations of the executive department can be properly related to the independence a highly scientific bureau must have. Really, the question is one of delicate balance, and of sensitive and intelligent equilibrium. This is between the stimulus and other values of linkage of science and technology to operations, and the restraining and narrowing effect that too close coupling can have.

Once more, the atmosphere in which this balance must be adjusted is shown by scientific judgments on the circumstances of the National Aeronautics and Space Administration. There continue to be many pleas on the one hand that the aeronautic and space missions of this agency should be operational responsibilities largely of the Department of Defense. But, on the other hand it seems to many of us that it is necessary to seek a level of sophistication which is possible in this new science and technology only when it is not directly dominated by urgent and immediate military requirements.

We feel that future requirements will also be more prominent in the operation of such a separate agency than when it is either part of a

general department of science and technology or of the Department of Defense.

We believe that this element of fluidity, which is the point I want to close on, is extremely critical to the flourishing of science and technology in the fashion that this committee has been persistently concerned with. And we think that there is much less of a commitment to one particular form of science or technology if, as the occasion arises, independent commissions may be set up to deal with that particular form.

Thank you very kindly, sir.

Senator GRUENING. Thank you very much Dr. Baker for a very excellent statement.

I want to ask you one or two questions. To repeat what I said in speaking to Secretary Strauss, this of course is in the nature of an exploratory operation, just as is the previous report concerning which you corresponded with the chairman of this committee, pointing out the usefulness of these previous studies. These are now continuing. There is this overshadowing fact upon the creation of a department, and that is—and I speak from my experience in government—a department has a certain prestige which a board, administration or a commission does not have. When the Department of Labor was separated from the Department of Commerce, as Mr. Strauss said before, it gives its functions a prestige and standing which it did not have when it was a part of the other Department. And similarly, I think there is an underlying idea among those of us who are interested in developing this subject. The Department of Science would give an emphasis and importance to scientific research that it may not have when it is scattered, as it is now, among almost all the major departments of Government. And what we are trying to find out is how this greater importance, this greater emphasis can be most effectively applied.

Now assuming that this is just a very tentative draft, and nothing in it is necessarily permanent, do you feel that the approach on the Department of Science is a wise one or not, or would you prefer to leave things as they are now and concentrate on developing the great variety of scientific activities which exist in the Department of Commerce, the Interior Department, and the Department of Agriculture, the Department of Defense, and in the various separate agencies?

Dr. BAKER. Well, sir, I believe that we are not yet ready for a Department of Science and Technology, although the scientific community is most appreciative of just the factors that you bring out with respect to the intention to propose such a Department of Science and Technology. The reason that we believe it is not yet the time comes back to this philosophy that we tried to mention earlier, of the importance of having science and technology firmly established as a way of life in operating areas. Recourse to them should be just as instinctive and natural therein as orderly budgetary procedures, and organizational procedures, and end-use procedures are now. And we fear that if, at this relatively early stage of the permeation of science and technology into our national affairs, there is too great a consolidation of the apparent responsibilities for science and technology, then operating departments will tend to be diverted from proper cultivation of science and technology as part of their own business.

Senator GRUENING. I think that is a pretty good answer. Of course, a Department of Science, in addition to whatever else it did, would serve as a catalyst and as a place for coordinating the various efforts. I think there is always a danger in every field that we will become too compartmentalized, and that the research that goes on in one agency isn't sufficiently related to the research that is going on in another, although as we are increasingly aware that very few endeavors that are not interrelated somewhere. And certainly that is true in the steadily mushrooming field of science, which really covers about every human activity in one way or another.

Dr. BAKER. Indeed so. Your observation seems particularly pertinent, in fact, to science which, as a distinguished British scientist said long ago, is primarily the record of interrelationships among the effects of nature. And in connection with this coordination and association that you mention, I think the great interest of this committee and the subsequent activity that was enabled by legislation from that interest, advanced a strong science information program. This work, the setting up of a Science Information Service, can itself have a very stimulating effect on the Government departments in pulling their research efforts together and correlating just these studies that you refer to. Because the national effort is so complex, is so diverse, a very effective method of recording and comparing the results is necessary. And this itself serves as one of the coordinating instruments in science.

Senator GRUENING. Well, I would say that the Secretary of such a Department of Science would of necessity be a genius, and he would know as much as any one man could know about what was going on in the 20 or 35 bureaus in which research is carried on, and would bring them together to see whether in each case a greater effectiveness might not result. That is what we are trying to find out. And I hope, in addition to your excellent statement, if you have any further suggestions or thoughts on this subject, you will submit them to the committee. And they will either be made a part of the record, if you desire, or kept for the advice of the committee.

Thank you, very much.

Dr. BAKER. Thank you, Senator Gruening.

Mr. GRUENING. That concludes the hearing for today. The hearings will resume tomorrow at 10 o'clock. The first witness will be Mrs. Clare Boothe Luce, former Ambassador to Italy, but here as a sponsor of the first legislative proposal to create a Department of Science.

(Whereupon, at 3:10 p.m., the subcommittee adjourned, to reconvene at 10 a.m., Friday, April 17, 1959.)

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CREATE A DEPARTMENT OF SCIENCE AND TECHNOLOGY

FRIDAY, APRIL 17, 1959

U.S. SENATE,
SUBCOMMITTEE ON REORGANIZATION AND
INTERNATIONAL ORGANIZATIONS OF THE
COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met, pursuant to recess, at 10:15 a.m., in room 3302, New Senate Office Building, Senator Hubert H. Humphrey (chairman of the subcommittee) presiding.

Present: Senators Humphrey, Gruening, Muskie, and Capehart.

Also present: Walter L. Reynolds, chief clerk and staff director; Ann M. Grickis, assistant clerk clerk; and Arthur A. Sharp, professional staff member.

Senator MUSKIE (temporarily presiding). The subcommitte will come to order.

We shall resume hearings this morning on the bills proposing the establishment of a Department of Science and Technology. I shall call the list of witnesses in order.

First of all, the Honorable Clare Boothe Luce.

It is a privilege to welcome you this morning.

STATEMENT OF HON. CLARE BOOTHE LUCE

Mrs. LUCE. I thank the Senator for his courtesy in calling me to appear here, to speak in behalf of the passage of S. 676. I am aware that I am not being asked as an expert, or even an amateur in the matters of science and the coordination and promotion of scientific efforts envisaged in this bill.

I think this courtesy is extended to me solely because I happen to be the first author of a bill to create within our Government a Department of Science.

That bill, H.R. 5332, was introduced by me on February 1, 1946, in the House of Representatives, where I represented the Fourth Congressional District of Connecticut.

In support of the present bill, I can do no better than to read to you, with your kind permission, a portion of the remarks I made on the floor of the House of Representatives in support of its passage.

Thirteen years ago I said—and I quote:

> Mr. Speaker, among the more important lessons we have to learn from the Second World War is the extent to which we—the whole human race—are now subject to the discoveries and inventions perfected during the past 5 years. The atomic bomb is only the most dramatic of these new and powerfully dangerous

forces which now control the destinies of nations and may determine the very existence of life on our planet and perhaps the continued existence of the planet itself.

All these new, violent developments of physical and chemical science may be put to use for the service of mankind instead of its destruction if, and only if, the policies which guide us from now on are founded upon facts and are carefully chosen in the brightest light of commonsense unshadowed by partisan bias. The difficulties of accomplishing this purpose of self-preservation have no precedent. Never before has any comparable situation arisen. To say that the problem must command attention from the very best and wisest minds should be so obvious as to need no mention. Yet in our system of government the fact of the problem must be made clear to the public, and every possible provision for its solution must be incorporated into the Government itself.

As is well known, various initial steps have been taken toward this end. One measure to create a National Science Foundation is now pending before the Military Affairs Committee of the Senate of the United States. The Navy Department has initiated a broad program to encourage scientific research in American educational and industrial institutions as shown by the appended article which appeared in the New York Times on January 27, 1946.

Many of us are aware that during the war the United States, alone among the great warring powers, refused to exempt its scientific students from conscription. Nearly every educator and scientist in the Nation protested against this policy and warned that it would lead to a grave scarcity of scientifically trained minds within a decade following the war. This folly we must now compensate as best and as speedily as we can by concentrating our Nation's tremendous organizational abilities upon the building of a framework which shall offer to scientists of all degrees of proficiency the most ample opportunities for study and research and shall assure talent the best reward.

This, I believe, can best be accomplished, and the results best integrated into the national defense and into the promotion of national health and welfare, by the creation of a separate executive department of the Government. Only the prestige which attaches to a regular member of the Cabinet will render the findings of any scientific body of sufficient weight to command the constant attention of the highest officials of the Government in the consideration and formulation of policy. * * *

Those are the reasons for which 13 years ago I introduced a bill whose purposes and goals were similar to the present bill. My bill, Mr. Chairman, was referred to the Committee on Expenditures in the Executive Departments.

I think it may be useful to ask ourselves why that bill was not passed, or for that matter even considered, in view of its obvious urgency.

At this point, Mr. Chairman, I have several pages of prepared statement on the background of the period which created in the Congress and among the public indifference, if not hostility, at least a wide indifference to the purposes of that bill.

I shall not take your time from more competent scientific witnesses who are waiting to read you these reasons which are now water over the dam.

With your kind permission, I should like, if I may, to insert them into the record.

Senator MUSKIE. Without objection, that may be done, Mrs. Luce.

(Statement referred to follows:)

STATEMENT OF HON. CLARE BOOTHE LUCE

Thirteen years ago the people and the Congress were concerned with what appeared to be far more urgent matters. The Nation was then groping its way toward the political, economic, and social stability that had vanished with the advent of World War II. At home the Nation faced a plethora of strikes, steadily mounting prices, aggravated shortages of foods, goods, and services and the conversion from wartime controls to a peacetime economy. Major strikes in the

steel, automobile, meatpacking, soft coal, railroad, electrical equipment and maritime industries throughout the year seized the public attention. At the same time the armed services were in the process of demobilizing 10 million men and women, and the widespread "send us home" movements among occupation troops were more imperative than a proposal to create a Department of Science. To compound the domestic chaos, 1946 was a year of congressional elections in which the Republicans scored an overwhelming victory, bringing to an end the era of the New Deal. Underlying all of this was a widespread fear of a major depression and mass unemployment. The trend of the times was toward eliminating agencies and bureaus and paring down Government expenses. The Committee on Expenditures did not look favorably upon any proposal to create a new department.

The American people in 1946 looked forward with anticipation to the coming era of international peace. In his state of the Union message at the beginning of the year, President Truman declared that our major foreign policy objective was to preserve a just and lasting peace "through genuine understanding and active cooperation" among the major powers. Political pundits and politicians discussed the importance of "bridging the gap between the United States and Russia." To suggest that there was an unbridgeable ideological gap was not merely heresay but in many sections of the country tantamount to political suicide. Indeed speaking on the floor of the House a few months before I had said: "Today it has become politically inexpedient for any public servant of this Nation openly to speculate on the size of the armed services in relation to those of any other nation except those of the defeated Axis Powers. Popular presumption is that the members of the United Nations Organization will always stay united, from which it will follow that there will not be another world war, in our time, and that we have no enemies avowed or potential, except those we have already licked. For a Member of this House to suggest that this may not be the case is honestly considered by many men of good will an international political indecency."

As the year progressed, differences between the United States and Soviet Russia became more far reaching. In March the Iranian delegate appealed to the U.N. Security Council on the presence of Soviet troops in Iran and 2 days later Russia's Gromyko began a 13-day boycott of the Security Council. By the end of June it became apparent to all but the politically halt and blind that an immediate agreement on international control of the atomic bomb would not be reached between the two major powers. During the year, however, the vast majority of Americans chose to live by the myth of Soviet cooperativeness that had been assiduously cultivated during 4 years of war. This era was described by Secretary of State Byrnes as the era of our "leaning over backward in order to avoid offending Russia." In such an atmosphere of high hopes and shattering reality, the bill "to creat a Department of Research and Science * * * to promote national defense and welfare" received short shrift.

Though only 13 years away, chronologically, this chapter of history now appears to belong to an era far more remote. Our illusions have been blasted by events that have since taken place. The seizure of Czechoslovakia, the Berlin blockade, the Korean war, the repression of Hungary, and the launching of sputnik not only made painfully obvious to us the nature of the Soviet threat but gave us an accurate measure of Soviet capacity for ruthlessness and its technical proficiency. In this brief interval our attitudes, our aspirations, and even our vocabulary have undergone significant changes. Words that could not be found in technical manuals 13 years ago cannot be avoided in reading our daily papers today. "Launching pad," "countdown," and "fallout" are only a few of the more obvious examples. Government agencies with names that would have seemed laughable and fantastic 13 years ago are now vital to our national security. And yet, despite the rude awakening to the importance of scientific development and research that our Nation and its leaders have undergone, we still do not have a department of the Federal Government that can provide the needed continuity, the official endorsement or the proper encouragement for our country's scientists. Government efforts have been sporadic and wasteful of effort and money. The attempts of nongovernmental agencies to do the job has resulted in needless duplication, execessive overlapping, and wasteful competitiveness.

Ten years ago the Soviet Union exploded its first atomic bomb. Our self-comforting illusion about our inherent scientific superiority was disturbed. On October 4, 1957, that pillar of false security crumbled. The sense of hysteria

that then gripped the country could have been avoided. The sense of panic that followed could have been minimized. A central clearinghouse of information would have prevented the many conflicting and often contradictory reports that followed the launching of the first sputnik. A Department of Science and Research would not only prevent the repetition of such an unfortunate incident but would act as a central information bureau for the multiple Government agencies, private organizations and universities engaged in scientific research. It would provide for the scattered scientific projects the type of organized information service that is available today to large segments of American industry. The National Research Council, the National Science Foundation and Dr. Killian's Science Advisory Committee have endorsed in principle the urgent need for such a service. A recent article on this subject (Harper's magazine, April, 1959, p. 70) said their reluctance "to act with respect to their several responsibilities in this field may result from their having been established at widely different periods of time, largely without reference to one another, and without any clear directive from Congress as to the authority of each." The writer (Allan Kent, associate director, center for documentation and communication research, Western Reserve University), concluded with the observation that "excessive fear of centralization is as destructive as any other fear—and the chaos of our present no-system is all too real." Whatever may be the reasons for the hesitancy to act, there is unanimous agreement on the urgent need for such an organization and none of the existing agencies have demonstrated their ability to solve the problem that becomes more formidable every day.

However, there is an equally, if not more demanding, problem that the proposed bill would assist in solving. This was also one of the objectives of the bill I introduced in February 1946. At that time there was widespread disagreement among scientists, Government officials and military men on the role of the Federal Government in the formulation of a science policy. The May-Johnson bill to continue military control of atomic energy was defeated despite the initial support it received from Dr. Vannevar Bush, Dr. E. O. Lawrence, Dr. James B. Conant, and Dr. Enrico Fermi, among others. Heated debate took place on the respective merits and shortcomings of the Kilgore committee report and the report published by Dr. Vannevar Bush. A number of legislative attempts (notably the 1946 Kilgore-Magnuson bill) were made to compose these differences, but it was not until 1950 that agreement could be reached on legislation establishing the National Science Foundation. But despite this evidence of wide differences among and within scientific, governmental and military groups, there was agreement that the fundamental failing in American science was in basic research. It is common knowledge that our major achievements have been in engineering and technology, and the spectacular successes of these achievements have often obscured the fact that many of them are based upon fundamental discoveries made in Europe in the late 19th and early 20th century. One of the purposes of the legislation proposed in 1946 was to stimulate basic research in the physical and natural sciences and to narrow the distance between the laboratory and the engineer. The experience of the war years not only put basic scientific research in a relatively unfavorable position, but also expanded the gap between basic research and applied research and this tendency has been growing ever since. The effort I made in 1946 failed; since that time no governmental bureau or private agency has yet succeeded in providing the necessary liaison between the two branches of science. The proposed Department of Science and Research is the first agency that will have at least the potential capacity for solving this increasingly difficult problem.

And in closing, there is one more reason that S. 676 has now become an urgently needed bill. The postsputnik proliferation of executive agencies, committees, and projects in separate existing departments, all pursuing their goals or missions in overlapping ways, all requiring constant and elaborate cross-checking just to keep one another informed of who's doing what, why, when, where, and with how much—all this is inefficient and costly. Furthermore, as every Congressman knows, each new agency which comes into existence tends not only to proliferate within itself, but with every year of its existence resists more fiercely consolidation with any other department of the Government.

Mr. Chairman, while I have not familiarized myself with the pros and cons concerning the transfer of certain existing agencies to the new Department proposed in this bill, I am heartily in favor of the purposes of the bill, and therefore

hope that the hearings will help to bring about its speedy passage, for it is a necessary and significant contribution to the security and prosperity of the whole Nation.

Senator MUSKIE. Thank you, Mrs. Luce. Senator Capehart has some remarks.

Senator CAPEHART. I just wanted to say, Mrs. Luce, that we are happy to have you here as a witness. I remember very, very well when you introduced this legislation a number of years ago when you were a Member of the House of Representatives.

I also want to say I think it is fortunate for the Nation that you have given so much time to your Government over the past many years. I had the privilege of visiting with you when you were Ambassador to Italy. I know you are going to be confirmed as Ambassador to Brazil; I think you should be. I think it is very, very wonderful that you should be so interested in this subject today to give us your time and come here as a witness.

Mrs. LUCE. Thank you very much, Senator.

Senator MUSKIE. Senator Gruening?

Senator GRUENING. Mrs. Luce, it is always gratifying to see someone who is well ahead of his or her time, as evidenced by the fact that 13 years ago you saw the necessity for this legislation, which, as you point out, has been made more necessary by the great proliferation of the many activities of science.

Yesterday, we heard some important witnesses in opposition to the bill who presented the view that they felt that each agency of the Government which is now pursuing scientific research, and practically all of them are, would be injured by the establishment of a Department of Science and that it would be much better to have the research carried on separately, for instance, in the Department of Commerce by the Weather Bureau, by the Bureau of Standards, by the Coast and Geodetic Survey, and, similarly, in the Interior Department by the Geological Survey, Fish and Wildlife Service, et cetera. What is your view of that?

Mrs. LUCE. Well, Senator, as I have said, I am not competent at this moment, not having given much thought to this particular problem in recent years, to say which of these components, existing scientific components, in our Government should be brought into this Department. Certainly some of them should be. But the Department which this bill would create would not, or should not, interfere with the efforts of any of the existing bureaus whether or not they remain in the places where they now exist—some operate extremely well as they are under Commerce—or are brought into the new Department. There is no reason to assume they would not operate there just as well, and perhaps even more effectively, since a Department of Science could harmonize and coordinate their efforts with efforts of other groups.

May I give you one very small example of the type of confusion that exists now and which can grow in the years ahead. Various departments of the Government—the Pentagon, for one, as well as other departments of the Government—send scientific missions of one sort or another to a foreign country. The U.S. Ambassador or the Embassy in that country has no method of coordinating these efforts, or of helping them to coordinate their efforts. This, of course, they could do if there were a science attaché from the Department of Sci-

ence in every embassy. Such an attaché would help not only to collect information on a systematic basis about the scientific developments in the country to which he is assigned, but would also help the other interested agencies to be sure they were not duplicating efforts of others and confusing not only American agencies at Rome, for instance, but the people of the country where they are assigned. It is not a question of interfering with scientific competition or the freedom of the scientific minds in these various departments; it is a matter of good organization which would save money and effort, and help our sciences—both basic and applied. I believe both our scientific information and achievements would then make a great leap forward.

Senator GRUENING. Mrs. Luce, at the time you introduced the bill, were extensive hearings held upon it?

Mrs. LUCE. Senator, I have already inserted the background of my efforts to secure passage of this bill. No, there were no hearings held on it at all. It was referred to the Committee on Expenditures in the Executive Departments, where it was buried, in the intervening years, along with a number of subsequent bills. I believe you have in your report the list of bills on this question introduced in later years which also received no attention. But it is important to remember that in 1946 people were fed up with the war, they were fed up with the expenses that the war had entailed, our men were being demobilized and brought home from far parts of the world, there was a hot campaign in the offing, and the watchword, of course, was thrift——

Senator GRUENING. Balance the budget then, too, wasn't it?

Mrs. LUCE. At least thrift in Government.

And, furthermore, there is a psychological fact that when we had the bomb—I introduced my bill in the period when only we had the bomb—many people did not believe we would ever lose this supremacy, and it was almost laughable for anyone to say—it was even considered somewhat indecent to suggest, as I did—that Russian technicians might get the bomb, and perhaps would be inclined, if they ever used it, to use it against America.

So the climate of opinion was quite different then from now. But I think now that the American people are, especially in this post-Sputnik time, are alert to the fact that Soviet science can conceivably overtake American science if we do not organize our own efforts in the most efficient way possible. And, one step, it seems to me, is to coordinate those efforts in a Secretary of Science and Technology in the Government.

Senator GRUENING. Well, we have at least moved forward to the extent where we are now holding hearings on this bill. And I think you can be very proud of the fact that 13 years ago you visualized the need for such a Department, which I hope will be fulfilled.

Mrs. LUCE. Thank you.

Senator MUSKIE. Mrs. Luce, I shall insert in the record at this point a copy of your bill H.R. 5332 of the 79th Congress, 2d session. I think it is important that we should have this historical landmark here in the record.

(The document referred to follows:)

[H.R. 5332, 79th Cong., 2d sess.]

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 1, 1946

Mrs. Luce introduced the following bill; which was referred to the Committee on Expenditures in the Executive Departments

A BILL To create a Department of Science and Research

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there is hereby created an executive department in the Government to be called the Department of Science and Research with a Secretary of Science and Research who shall be the head thereof, to be appointed by the President, by and with the advice and consent of the Senate; and who shall receive a salary of $15,000 per annum, and whose tenure of office shall be like that of the heads of the other executive departments.

The purpose of the Department of Science and Research shall be to foster, promote, and develop the study and spread of scientific knowledge and its practical application to the enforcement of peace and the attainment of high living standards throughout the United States and the world.

The Congress hereby finds that the fullest development and use of the Nation's scientific and technical resources is essential for the safety and continued welfare of the Nation. The Congress further finds it necessary for such development and use to create an executive department, in order to correlate on the highest governmental level the programs of national defense, national health, and proper conservation and use of the production and natural resources of the Nation all of which will increasingly depend upon and be affected by scientific discoveries and inventions of the most far reaching character.

SEC. 2. That there shall be in said department five Assistant Secretaries of Science and Research to be appointed by the President, each of whom shall receive a salary of $12,000 a year. The Assistant Secretaries shall be charged with the duties, respectively, of—

(1) a Bureau of Physics and Mathematical Science;
(2) a Bureau of Public Health and Social Science;
(3) a Bureau of Scientific Education and Information;
(4) a Bureau of Biological Sciences; and
(5) a Bureau of Engineering and Technological Sciences.

The functions of each of these Bureaus shall be as defined by their respective titles and as may be further prescribed by the Secretary of the Department. In order to insure the greatest benefit to the national defense such additional personnel as may be needed in any Bureau from time to time may be filled by properly qualified members of the armed forces of the United States selected in the discretion of the Secretary by agreement with the Secretaries of War and the Navy.

Appointments of personnel necessary to discharge the duties of the Department of Science and Research and to carry out the purposes of this Act shall be made and compensation fixed, except for assistant secretaryships, in accordance with the provisions of the civil-service laws and regulations: *Provided*, That when deemed necessary by the Secretary for the efficient administration of the Department and the fulfillment of the purposes of this Act, the Secretary shall be empowered to employ such technical, scientific, and other experts without regard to any civil-service laws and may fix compensation for such experts without regard to the Classification Act of 1923, as amended.

SEC. 3. That the Congress specifically disclaims any intent under this Act to empower the Department of Science and Research to direct or control the course of independent research into the various sciences. It is the intent in creating the Department to provide a governmental instrument with which to utilize and coordinate all such discoveries and inventions as may best promote the national defense and welfare.

For this purpose, the Secretary shall solicit the active and continuous voluntary cooperation of all qualified technical and scientific educational institutions, and of the professional and learned societies which shall be invited to nominate candidates yearly for an advisory council to the Department.

Such advisory council shall consist of not less than one hundred members, with adequate representation of all branches of science, appointed by the Secretary for a three-year term, one-third of the membership being renewable each year. Temporary appointments for one year, and for two years, will be made during the first six months after this Act becomes law.

The council shall elect its own executive committee, and special committees to advise with the Secretary and the Assistant Secretaries, respectively, on the general and the specific activities of the Department and the Bureaus.

Within one year after the passage of this Act the Secretary, each Assistant Secretary, the advisory council, and each special committee of the council shall issue separate reports and recommendations to the President and to the Congress regarding operation of this Department and setting forth such changes, amendments, or extensions as may appear necessary or desirable in the light of actual practice.

Senator MUSKIE. May I say for myself that I appreciate your interest, and the time and effort that you have taken to come here and indicate to this subcommittee your interest in this legislation.

Mrs. LUCE. Thank you so much, Senator.

May I be excused?

Senator MUSKIE. You certainly may.

Our next witness will be Dr. Wallace R. Brode, chairman of the board of the American Association for the Advancement of Science, also science adviser to the Secretary of State.

I should like to place at this point in the record Dr. Brode's distinguished background.

(The information referred to follows:)

BIOGRAPHICAL SKETCH, DR. WALLACE R. BRODE

Born June 12, 1900. Married.

Education: B.S., Whitman College, 1921; M.S., University of Illinois, 1922; Ph. D. in organic chemistry, University of Illinois, 1925; D. Sc. (honorary) Whitman College, 1955; D. Sc. (honorary) Ohio State University, 1958; Guggenheim Fellow, Leipzig, Zurich, and Liverpool, 1926–28.

Professional experience: Professor of chemistry, Ohio State University, 1928–48; associate director, National Bureau of Standards, 1948–58; science adviser to the Secretary of State, 1958–.

President, American Association for the Advancement of Science, 1958; chairman of the board of directors, AAAS, 1959; member, National Academy of Sciences.

Senator MUSKIE. You may proceed, Dr. Brode.

STATEMENT OF DR. WALLACE R. BRODE, CHAIRMAN OF THE BOARD, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, AND SCIENCE ADVISER, DEPARTMENT OF STATE

Dr. BRODE. Senator Muskie and members of the subcommittee, my presentation this morning is not as a representative of the Department of State, because the Department of State does not have a direct operating science function. Rather, I am a representative of science in my capacity as chairman of the board of directors and past president of the American Association for the Advancement of Science. My position in the Department of State as science adviser to the Secretary of State does, however, indicate that the Department of State has a recognition of, and interest in, the Nation's science program.

I must at this point express my keen appreciation for the very able presentation which your previous witness, Mrs. Luce, has made,

and the interest which she has and diplomatic respresentatives have in science in our foreign operations.

The increasing importance of science in our modern civilization is apparent in the trend in many nations to create cabinet posts, high level advisers, commissions, councils, and departments of science to cordinate, direct, advise, and plan a nation's scientific activities.

There are cycles in the evolution of a science program through which a nation progresses, as is well illustrated in Prof. A. Hunter Dupree's book on "Science in the Federal Government." There have, in the past, been numerous attempts to create a Department of Science in our Government and there have been numerous successful efforts to defer such a move by those who might lose directional authority in such a reorganization. From the study by Professor Dupree it is evident that, in general, the scientific staff or heads of bureaus or divisions within a department seldom took a position which evidenced a desire to change their location within the Government and in fact they, in general, accepted the Department line in which they were an integral part. Hence it may be difficult to determine from those who really should be best informed as to what would be the best science operational structure.

Many groups of scientists both within and outside the Government have been concerned about an improvement in the efficient organization of science to cope with this expanding area of man's knowledge. Science is expanding at a rate of about a 10-percent increase per year as compared with a population growth of about 1.7 percent per year. Unless we plan well, we will become swamped with our science proliferation in the not-too-distant future.

As a career Government scientist I am in a somewhat different class than the other scientists from universities or industry. The Government scientists represent some 17 percent of all of our scientists, 58 percent are in industry, and 25 percent in universities.

The Government operates directly a number of important scientific establishments and these are staffed with a corps of loyal and dedicated workers. Many of these scientists have been awarded national prizes, honorary degrees, memberships in the National Academy of Sciences, and official positions in our national scientific societies. Yet there are those who feel that the Government should contract its research to non-Government laboratories and organizations and that Government scientists and laboratories should not be maintained. This feeling is held in spite of the fact that the major portion of the Government's funds for research are turned over to private agencies to spend.

The neglect of Government scientific laboratories and research through both limited support financially and failure to recognize or utilize competent leadership competency has driven some of the good scientists out of career service. I feel that a recognition of science as a basic entity in our governmental organization by creation of a Department of Science would go a long way toward strengthening the status of career scientists as well as strengthening the Nation's capabilities and our international position in science.

In some areas of the Government, such as the Department of State, a career employee has reasonable expectation of promotion, if his capabilities justify, to top policy positions such as Ambassador or

Assistant Secretary, yet in those departments of the Government in which science is now distributed it is not expected that a career scientist should occupy a policy-level position in the Department. In those few cases where a scientist may occupy a policy-level position in the Department, he is imported on a short-term appointment with a leave of abscence from an industry, university, or private life. It just does not stand to reason that we can hold or attract many competent leaders in the career employment of the Government if we do not provide such persons with an opportunity to lead.

In the first 50 years that the National Bureau of Standards was in existence, it operated under the direction of 18 Department Secretaries in 2 different Departments and had more than 100 Under Secretaries and Assistant Secretaries to serve under with an average tenure of less than 3 years each. This policy-level group was conspicuous by a lack of scientific background. In contrast, the Director's position in the National Bureau of Standards in this 50-year period was held by only four scientists, each averaging a tenure of 12.5 years. Most of these Directors were considered long-service career scientists and each was elected to high office in national scientific organizations in recognition of their distinguished contributions to science.

In further contrast, one might indicate the loose relation and coupling between a nonscientific department and one of its scientific appendages by noting that in an attitude survey the scientific employees were asked as to whether they considered themselves a part of the Department—to which only about 2 percent of the staff queried answered in the affirmative.

Perhaps, you ask, if science is destined to expand rapidly, why not leave it split up into segments, as it is now, since each of these seems destined to become a major entity in itself. The facts of life, however, indicate that greater centralization is invariably required when communities, subjects, or publications tend to grow into overlapping territories. The coordination problem is not faced so long as each subject is an isolated community or area of knowledge. Whether we wish to admit it or not, we have, it would seem, been moving in the direction of a coordinated national science policy and program which is in essence the start of a National Department of Science.

In nongovernmental science we have seen the need for the maintenance of central coordinating bodies. The American Association for the Advancement of Science, in which I have served as president and am now the chairman of its board of directors, bears, in some respects, in the realm of certain phases of science, technical societies, the role that a Department of Science would in our Federal Government. In a similar manner the American Chemical Society does this coordination for various chemical interests in science. There is difference, however, in some of the methods by which science is integrated or coordinated but the trend appears to be through combinations of strength and efficiency. Scientific societies have formed combinations to improve efficiency and operation even though they have maintained a degree of authority and independence. As, for example, the American Institute of Physics in which a group of separate societies have combined to form a group which would provide a more efficient central operation for publication. Separate societies have combined through

the American Association for the Advancement of Science to provide for interchange of ideas and cross-fertilization. For purposes of maintaining a coordinated operation for interrelation between Government and non-Government organizations, the National Research Council provides a working organization for certain forms of direct operation as well as still preserving the separate cooperating groups.

Some of our national scientific organizations have found a greater degree of strength through combination into international groups or unions and these international unions in turn have found added strength through an International Council of Scientific Unions.

There has been a continuous evolution or movement within our own Government to strengthen the national science program through the creation of a National Science Foundation and the new science areas such as the Atomic Energy Commission and the space agency as well as expansion of activities in health, agriculture, defense, and other areas.

It has become evident that there is a need for some form of coordination of these activities, and in fact, the President's Science Advisory Committee has recommended the creation of a Science Council to supply some of this need.

There are some who have felt that this Council was created to avoid a trend toward a Science Department, yet there are others who feel that this newly created Science Council was a logical step toward a Science Department. In which direction the Science Council may lead, will, to some extent, be dependent upon just what authority the Council assumes and the character or leadership of its designated personnel. If this Council is staffed by policy level persons who are recognized as competent science administrators or scientists with executive ability and the Council assumes a role of leadership in establishing the national science policy, it may well lead to the formation of an effective Department of Science. Effective coordination and the avoidance of unnecessary duplication of effort in the several strong scientific agencies of the Government require some leadership with appropriate authority to conserve our efforts and improve our efficiency. As an example one might cite the fact that some six major agencies of our Government are each requesting authority to establish offices in a single foreign country to provide basic research contracts in science, capability surveys, and exchange of basic scientific information. A cooperative program for this effort through a combination of these agencies to work as a unit with respect to basic scientific research would provide a better impression on our host government as well as a more efficient effort. To foreign scientists abroad it would appear in a sense that such an office was a representative of a Department of Science, just as military and agriculture attachés represent their respective departments.

Although other governments have found that science may be coordinated to some degree through councils, committees, or loosely knit combinations, the most successful trend is toward an operating group of authority even though the leader of the group may be a non-Cabinet person so as to avoid some of the possible political angles in selection or operation.

The newly organized Science Council was, I believe, in its original concept designed to serve as a focal point for coordination of scientific

policy planning in our Government and in fact its formation was suggested because it was felt that the scientists were not assuming their share of responsibility in the leadership of planning our Government science program in their area of competence. In the original concepts there was some feeling that departments concerned might designate top scientists, and I would have hoped that due consideration would have been given to competent career Government scientists, to serve in the policy area of the Department. In its final form the suggestion that the Science Council should be staffed by scientists in a policy level in the departments was not included. In its present composition less than one-third of the regular members of the Science Council are to be found among the some 100,000 scientists who are listed in the current edition of "American Men of Science." There is often a depreciation of professional persons as qualified to advise on the administration of the organization in which they have made a career. There is a reluctance to use distinguished scholars to serve on boards of trustees of universities. Schoolteachers with years of experience are not considered competent to serve on school boards.

I would make a plea that leading scientists should be included in the planning for an ultimate science department and that career Government scientists should be included as members in such advisory scientific bodies.

I note with pleasure that such service is permitted by implication in most current legislation through an indication that, if the designated council or board members is a Government employee, his compensation should be in accordance with Government regulations.

I am not impugning in any sense the excellence of advice and assistance which is supplied to our Government through the high level scientists, from universities and industry, who constitute our science advisory committees, Board of the National Science Foundation, or other similar guiding and policy establishing bodies. However, the absence of Government career scientists in these bodies which establish Government science policy does not improve morale or confidence in the ranks of our career Government scientists. If there is a feeling that the career scientist in the Government is incompetent, there are of course two directions to move. One is to strengthen science by creation of a status of distinction to attract high level career service—such as could be done through a Department of Science. The other direction is to place or maintain Government science bureaus and agencies as small independent agencies or as appendages to major departments with a nontechnical administration and the contracting of the Government's major scientific research responsibilities to nongovernmental scientific boards and institutions.

I feel there is a place for both governmental science and contracting or grant support to nongovernmental agencies and institutions, so as to take the optimum advantage of personnel and facilities. I also would insist that for the purpose of maintaining competence and efficiency, the essentially technical rather than basic science areas of our Government activities such as Defense, Agriculture, and Health should maintain competent laboratories and staff. As a part of the attribute of a good technical staff there should be opportunity for a certain amount of basic research.

With regard to the composition of a Department of Science, I would expect that the greatest criticism of a Department of Science proposal will be with regard to the areas, agencies, or parts of the Government that are to be included or omitted from this Department. Scientists and administrators may not be convinced that the areas selected or omitted in the present proposal are the most desirable. Two major decisions are required, one as to whether a Department of Science should be formed and a second as to the composition of such a Department. A Commission of governmental and nongovernmental experts in science and nonscience areas, similar to a Hoover Commission type, might consider these problems and especially consider the second phase; if a Department of Science is inevitable, just what activities of the Government should be included? The answer to this latter question has not been made by those who do not favor a Department of Science and hence we have only limited advice from many persons who should be in a position to present a knowledgeable opinion.

I would like to add that by comparison the agencies included in the Lloyd Berkner proposal—essentially a Department of Earth Sciences—are quite different than those that are proposed in the current legislation, and in turn quite different from a list which I previously suggested to this committee a year ago and which appears in Senate Document 90, page 20. All of these suggestions were made with good reasons, and hence provide perhaps the evidence of the need for a careful study to obtain the most safe answer.

The objective of a Department of Science may primarily be to provide science a greater prestige position and representation. Certainly this can in part be effected by Advisory Committees and Councils; which again may emphasize the idea that there is no sharp line to be drawn between a strong policy guiding Council and a coalition Department of separate agencies operating under responsible departmental leaders, who may be the separate agency heads.

A Department of Science should extend its influences from education and training through university grants and Government research, to the support of the publication and dissemination of scientific knowledge. Its range technically should serve the alphabetical list from astronomy to zoology with proper coordination by intergovernmental grants or contracts to support certain phases of basic science in other governmental departments where there is a competence which should be supported, such as agronomy research in agriculture, high temperature research in a Defense laboratory, etc.

Much of the work of the Atomic Energy Commission, Space Agency, and National Institutes of Health is more properly basic research and it may well develop that such areas should be included in a Science Department.

In a recent poll by Science Service, of the opinion of the heads of some 50 scientific societies, only about 5 percent of those polled were opposed to a Federal Science Council. There was an almost even split of opinion as to whether there should be a Department of Science and a 95 percent vote against a proposed Academy of Science, similar in concept to West Point or Annapolis. It would seem that the issue of a Federal Science Council, which was favorably received, has been in part effected through the activities of the President's Science Ad-

visory Committee and the creation of the governmental Science Council. These two bodies operate independently and represent on the one hand non-Government scientist experts and on the other hand principally nonscientist Government experts—with a small group of Government scientists attached to both of these, largely as observers and consultants rather than as members of these bodies.

I have indicated that there are various directions or trends in scientific work and research which we can follow. We can support the concept that the Government should provide only the funds and that the expenditures, programing, and direction of scientific research should be confined to nongovernmental boards to assign and to nongovernmental laboratories to perform; in those areas where there must be a tie to the Government, the Secretaries, Commission members, Directors, et cetera, should be chosen from the nongovernmental areas to serve a limited time, with the expectation of return in a year or two to civilian life, to the university, or industry from which they are on a leave of absence. I do not depreciate the competence of these individuals to plan scientific research and development operations but such direction and turnover in universities or industry would not be considered as a method of promoting efficient operation or work morale.

I do not feel that either the Science Council or the President's Science Advisory Committee would be in the least reduced in importance or value as a result of the creation of a Science Department, for much of science will, of course, remain in separate departments and in our nongovernmental agencies. Coordination is essential, part to be effected by a Department of Science and part through integration with other areas of scientific and nonscientific activities.

Typical of a nearly completely nongovernmental operation is that of the Atomic Energy Commission or National Science Foundation, in which the agencies operate no laboratories or work staff of their own but do all work by contracts and these almost exclusively with non-Federal agencies. In fact contracts with, or support to, other Federal laboratories is an exception which is seldom practiced. The actual leaders in these programs in the Government agency are generally persons who come on leave from universities or industry, often have little experience in or concept of Government agency operation, and sometimes are opposed to Government operation or Government institutions.

On the other hand, we have other areas of science, such as those in health, agriculture, and physical standards, where there are strong scientific laboratories in the Government, staffed by distinguished and recognized leaders who have a long and creditable record of scientific accomplishments and these laboratories are under the direction of career scientists who have risen in the service and in the world's scientific community.

I do not imply that both contract and direct operation of research are not compatible or that simultaneous conduct of these two would not lead to greatest efficiency. I do feel that within the Government these efforts should be coordinated and due recognition should be given to Government scientists in their sharing in such coordination. The integration of the Government's science support in the Government and in non-Government areas should involve the combination of our

Nation's science leaders in both Government areas. Lastly the science program of the Nation needs to be properly integrated into national and international programs in the nonscientific areas of economics, political science, culture, education, and human relations.

Thank you.

Senator HUMPHREY (presiding). Thank you very much, Dr. Brode. We are very grateful to you for your excellent statement and your willingness to appear before the subcommittee and discuss with us this proposal of a Department of Science and Technology, or as something like it, with a view to coordinating the science and engineering operations of the Federal Government.

Yesterday, in the opening of these hearings, I indicated that the bill was not to be looked upon as a final draft, that it was merely a beginning, that we were seeking constructive criticism, constructive proposals, alternatives, and that our primary objective was to improve the effort at coordination in the Federal Government in many areas of scientific activity in which the Federal Government participates. You have covered this quite well and, may I say, very comprehensively.

I want to ask just a few questions with reference to your statement. I regret that I could not be present for the first part of it. There are many things going on in the Capitol today, one right now that I am supposed to be at; Dr. Castro is at the Foreign Relations Committee. I am a member of that committee, too. The trouble is one needs to have not only a split personality for politics, but somehow to be able to divide up the body into two mobile proportions.

Dr. Brode, just a question in reference to your work over and beyond your direct testimony—this is a matter of personal information. I am sure you know that I have long been interested in the so-called science attachés within the embassies, and was one of those who for a considerable period of time protested the removal of these scientists from our embassies, feeling that we were losing contact with the international scientific community because of it. How have you progressed in working with the Government and the Department of State as the adviser on the matter of recruitment and replacement of science attachés in the embassies?

Dr. BRODE. I feel, Senator Humphrey, that we have done exceptionally well in the quality and number of people that we have been able to recruit. They are now moving into the field. You may know that Dr. Piret, from the University of Minnesota, is leaving this week to go to France to be our scientific attaché there. We have staffed several of the embassies now, and we are staffing most of the balance of those for which we were authorized, and they will be in operation by July.

Senator HUMPHREY. How many are you authorized to appoint?

Dr. BRODE. We had nine posts authorized originally, and we are planning ultimate expansion, of course, as science and the need expands.

Senator HUMPHREY. Nine posts, mostly in Western Europe?

Dr. BRODE. Yes; and some in the Far East, and South America, as well.

Senator HUMPHREY. I hope you have more.

Dr. BRODE. I hope so, too.

Senator HUMPHREY. It seems to me that if we have to have anywhere from 50 to 60 cultural attachés, we might want a few more scientists.

Dr. BRODE. I think you should also be aware that Loy Henderson has suggested, and we are putting into effect, a partial coverage in some 20 other embassies by using Foreign Service officers with scientific background. For instance, Ambassador Strom, recently appointed as Ambassador to Bolivia, had his original education in mathematics. We find that a great many of the Foreign Service officers have science training and have found that scientific reasoning may be useful reasoning to apply in your diplomacy. We are going to use a number of Foreign Service offices for partial coverage in those areas where we feel at the present time we cannot afford a full-time coverage. There will be approximately 30 embassies covered by science in some form or other.

Senator HUMPHREY. Very good. That is very reassuring.

You mentioned, Dr. Brode, the proposal that has been discussed by others, namely of establishing a commission, a high-level and nonpartisan commission, to study, first of all, the advisability of creating a Department of Science, and, secondly, to study the agencies and bureaus in the Federal Government in order to determine which of them should be incorporated in said Department. And I imagine it would be well to study also the line of authority or the amount of control that would be exercised by the Cabinet officer or the top echelon of the Department over the various bureaus of the Department.

Dr. BRODE. I would agree very much that there should be such a commission; and I think this commission should consider some of the unusual situations which develop where science may approach the dividing line between the legislative and the judicial area, such as the Food and Drug, and the Communications Commission, and the Federal Trade, and others, where scientific decisions, even in medicine, border on a legal decision. There may be some need to coordinate these areas with the great increase in science.

Senator HUMPHREY. Would you suggest as a formula for such a commission representation from the legislative branch of the Government and the executive branch of the Government, and then from the public, with emphasis on the scientific community?

Dr. BRODE. I certainly would. There must be this coordination and correlation between the scientific community and the nonscientific community.

Senator HUMPHREY. Your reference to the participation of Government scientists in these proposed agencies, including the Federal Council, which is an established agency now, I think, is well taken. I want this record to show that, insofar as I am personally concerned, every bit of inquiry and all observations relating to the scientific personnel in the service of the Federal Government, that I have ever made, is on the plus or constructive side. It seems to me that we are very fortunate in this Government to have many people who are willing to work long hours at pay scales that lead to anything but long-term security and riches.

Dr. BRODE. I may assure you that the scientists in the Federal Government are also aware that you have supported them, and they are very appreciative.

Senator HUMPHREY. Thank you very much. I think it is a real sense of dedication that we see here in the scientific personnel, as well as in others.

Now, I was interested in the poll of the Science Service to which you referred in your statement. It relates to the first part of that poll, to the creation of a Federal Science Council. Does that mean the established President's Council on Science and Technology?

Dr. BRODE. No, it did not. The wording of the poll did not imply this. In fact, the poll went out before this Council was established, and the definition of this was a Federal Science Council and coordinating body. It implied rather an advisory committee, including both, I think, nongovernmental and governmental people together. It was not defined in the same terms as the present Council.

Senator HUMPHREY. The present Council on Science and Technology, which was recently established by Executive order, is heavily loaded with agency personnel; is that not correct?

Dr. BRODE. The entire composition is selected from separate agencies of the Government.

Senator HUMPHREY. Dr. Killian?

Dr. BRODE. Dr. Killian represents the Executive Office.

Senator HUMPHREY. In other words, the non-Government, private scientific community, is not included in this representation?

Dr. BRODE. That is quite right. As I said in my statement, these two bodies, that is, the President's Scientific Advisory Committee, headed by Dr. Killian, and this Council, are independent. That is, the President's Scientific Advisory Committee represents non-Government scientific experts, and the Science Council, on the other hand, represents principally nonscientist Government experts. In this Council there are some scientists, about a third of them, and the balance are high-level administrative experts and members of the Cabinet or Under Secretaries and Assistant Secretaries.

Senator HUMPHREY. Do you have any suggestions as to the change of the composition of such a Council or any improvement that you think might lend itself to improvement?

Dr. BRODE. I think that it was Dr. Piore's original suggestions in his earlier discussions—and Dr. Piore was the Chairman of the Subcommittee of the President's Advisory Committee which made the recommendations for the formation of the Council—that it was his hope that the separate departments of the Government would bring into their departments, either from promotion within the staffs themselves, or by bringing in from the outside, high-level competent scientist advisers who might then be assigned positions such as I hold in the Department of State, or the position which Dr. York holds in the Department of Defense and that these might then constitute the membership of a Science Council. I think if the movement goes in this direction, it will accomplish what is desired.

Senator HUMPHREY. In other words, either to upgrade some of the presently employed technical and scientific personnel in the departments into responsible—into higher positions so that they can serve?

Dr. BRODE. At the policy level.

Senator HUMPHREY. Or to bring into the agencies highly qualified scientific talent outside the Government at policy level?

Dr. BRODE. Yes.

Senator HUMPHREY. And assign these persons to the Federal Council?

Dr. BRODE. That is right.

Senator HUMPHREY. Well, with my limited experience—and it is very limited—every time you set up one of these councils or committees, interagency committees or councils, there is always written into the Executive order, in the description of its composition and functions, that the Assistant Secretary, or the Secretary, will be a member, and then somewhere down in the fine print it will say that he may delegate his function to an alternate. And while it looks mighty good on first glance, as if you are getting a meeting of the Cabinet, you know, on sort of a swing shift, you really end up not with that at all, and you frequently end up with not having the trained personnel in the interest field.

I don't want my remarks to be interpreted as saying that those who serve are not competent, because they are, but they may not be expertise or as competent as others in the area of the specific discipline that we are trying to promote. And I think that is your general thinking, isn't it?

I really believe that it would be something that this subcommittee might well want to note, specifically for inclusion in any report we may submit to the Senate that consideration should be given to this particular part of Dr. Brode's testimony, relative to the upgrading of personnel, and the policy positions and bringing into Government better qualified scientific personnel.

I have one more question before I turn this over to my colleague here—the scientist on our committee. You see, we practice what we preach here.

I wish to just ask a few questions about your comments relating to the Atomic Energy Commission and the National Science Foundation. First of all, the Atomic Energy Commission does have its own laboratories in some places?

Dr. BRODE. Of this, I am not aware. I was under the impression that all laboratories of the Atomic Energy Commission are contracted.

Senator HUMPHREY. Contracted, are they?

Dr. BRODE. The Los Alamos is with the University of California, the Livermore Laboratory with the University of California, the Oak Ridge with the National Carbide and Chemical Co., and Hanford is contracted with the General Electric Co.

Senator HUMPHREY. So that these contract laboratories, even though they are strictly under the AEC control, you consider these as private laboratories?

Dr. BRODE. That is right.

Senator HUMPHREY. There is a summation of Federal support of research institutes by contracts, compiled by the National Science Foundation, on pages 47 and 48 of Senate Report 120, submitted by this committee on March 28, 1959. I was thinking, however, of private laboratories, for example, where you have science projects allocated by contracts or grants to a university, and the dean still exercises control over them.

Dr. BRODE. I think it is difficult to draw this line.

Senator HUMPHREY. So you would call Oak Ridge and Argonne and Hanford and all these private laboratories under contract?

Dr. BRODE. That is right.

Senator HUMPHREY. Now, the National Science Foundation requires just a little more discussion here. I was one of those who was a cosponsor of that particular proposal and I have also been interested in it. I sometimes wonder why we couldn't convert the National Science Foundation into really a Department of Science as such, with the Director of the Foundation being named as the Secretary. Or, if not at the Cabinet level, to have it at the agency level. That is the next level down, supposedly, from Cabinet level, and coordinate all of the scientific activities under the National Science Foundation. It seems to me that when we designed that legislation that we had that in mind.

Dr. BRODE. I think this goes back to your proposed committee to evaluate and determine what might be done, and they might conceivably come up with this recommendation. Actually, an expanded National Science Foundation, to serve as the Secretariat for the Science Department is not inconceivable.

Senator HUMPHREY. It seems to have some of the makings of a good proposition, because of the background and the experience of the National Science Foundation. And you know, a year ago, when we wanted to do something on this matter of the assembling and correlation of all of the many scientific documents, their translation, and the abstracting, the bibliography work that went with it, the Congress put this all finally in the hands of the National Science Foundation, placed the general responsibility, at least, upon the National Science Foundation. It is my understanding that it has worked quite well, but the committee will want to review the progress made on this program later in the session.

Dr. BRODE. I believe the President has issued an Executive order that this scientific information and dissemination be coordinated through the National Science Foundation.

Senator HUMPHREY. We feel that we had something to do with that. The committee had everybody who we felt could contribute to the development of a proper program in here for days in a critical analysis of the deficiencies in the program, and everybody ended up liking each other. So we decided that we would later in the present session of the Congress, continue our efforts to improve the coordination of our abstracting and translation programs.

Senator Gruening?

Senator GRUENING. As I listen to the testimony of Dr. Brode and others, I find there is a very practical obstacle in the approach to this problem. That is, that while there may be a consensus in favor of the abstract proposition of creating a Department of Science, when we get down to the concrete reality as to what shall go into that Department we are going to have a wide diversity of opinion and encounter a good deal of opposition. From my experience in Government, I suspect that the Cabinet officers heading various agencies will resist the cession of the scientific agencies within those departments to another department.

I believe that the only way we are going to arrive at a solution is to have some kind of a Hoover Commission with authority and

ample opportunity to study and have a mandate to recommend what is going to be. And I think it is very helpful if you would submit to the committee a list of potential members of such a commission, because, obviously, they would have to be people with a diversity of interest and knowledge, and also well respected by their associates in their various disciplines. But I think unless we have something of that kind, the program for the Department of Science is going to founder on the rocks of departmental jurisdictionalism, if I may coin that word.

Do you think that such interdepartmental conflict is not a possible impediment?

Dr. BRODE. I think that you have put your finger on the major impediment in this program. I would be delighted to advise; and I am sure that others, Dr. Bronk of the National Academy and members and leaders of other scientific and technical societies, would be delighted in providing advice on who might well constitute such a committee.

Senator GRUENING. Well, I hope we can proceed along those lines, because I have a feeling that something is needed to coordinate all our vast scientific efforts, in a steadily increasing field, and one of the reasons that makes me feel the Department of Science would have value is that there is a certain amount of prestige and authority in a department with an officer at Cabinet level in charge.

It is a fact that these various commissions and subagencies which are created from time to time do not have quite the weight and authority that such a department would have.

Turning to one other question, it interested me very much to hear about these science attachés. You mentioned there were some nine countries to which they were now assigned. Do you recall which nine they are?

Dr. BRODE. We have authority to place in nine countries. They are moving in. They are not all there. The countries which were originally authorized are England, France, Italy, Germany, Sweden, Russia, India, Japan, and a country in South America.

Senator GRUENING. One other question. Will the scientists assigned to these posts be familiar with the language of the country to which they are assigned?

Dr. BRODE. I think this is one of the things of which I am most proud. In each case, even in Japan, the scientists know and speak the language, have lived in the country, and know the people; and they are well recognized by those scientists in the country as being authorities in the field and are highly recognized scientists. Professor Piret, whom I mentioned earlier, is going to France from the University of Minnesota, and speaks French fluently. He has honorary degrees from French universities, as well as an earned degree in both French and American universities, and is well recognized by the French scientists. I think he will be most welcome.

Senator HUMPHREY. Excuse me, Senator Gruening. I asked for a biographical sketch on Dr. Piret, and I am going to put it in the record right now, because I want this committee to know the kind of men that are selected.

(Biographical sketch of Dr. Piret follows:)

BIOGRAPHICAL SKETCH, EDGAR L. PIRET

Born July 1, 1910, Winnipeg, Canada: U.S. citizen, six children.

Professor of chemical engineering, University of Minnesota; B. Ch. E. 1932. Ph. D. 1937, doctorate in biological chemistry and bacteriology, University of Lyon, 1936. Sigma Xi, Phi Lambda Upsilon, Tau Beta Pi.

Engineering research consultant to the vice president in charge of engineering, Minnesota Mining & Manufacturing Co., St. Paul, Minn., 1937–43. Chief chemical engineer, same company, 1943–45, consultant since 1945.

Principal science officer, American Embassy, Paris, France: Member, International Relations Committee, Engineers Joint Council, 1954 to date. National awards committee A. I. Ch. E., 1957. New York Academy of Sciences, symposium committee, Ind. Eng. Div.; Am. Chem. Soc. 1955–.

Chairman, unit operations division, national program committee, American Institute of Chemical Engineers, 1951–52.

President, Twin City Section A. I. Ch. E., 1949; director, 1951–52, 1955–56.

Program chairman, Minneapolis meeting, fall 1950, A. I. Ch. E.; symposium chairman, French Lick meeting, 1952; speaker, New Jersey section annual meeting, 1952.

Fulbright research professor at the University of Nancy and the University of Paris, France, 1950–51. Friedel Medal of the University of Paris, 1951. Named Officier d'Acadèmie, Palmes Acadèmiques, French Ministry of Education. Medaille of the University of Liege, 1950, Belgium. 1954 Bronze Medal of the Swedish Association of Engineers. Lecturer, Royal Institute of Engineers, Holland, Delft, 1954. Recipient Croix de Chevalier de la Légion d'Honneur, France, 1957.

Editorial board "Chemical Processing", Putman Publishing Co., 1953–56. "A. I. Ch. E. Journal," A. I. Ch. E., 1956–. "Chemical Engineering Progress" A. I. Ch. E. 1956–.

Director since 1954 of a chemical products from peat project sponsored by the Minnesota Iron Range Resources and Rehabilitation Commission.

Recipient of Walker Award of the American Institute of Chemical Engineers in 1955 for excellence of publication. Over 50 publications and patents on continuous reactor theory and design; control theory; leaching; heat transfers; fermentations; high vacuum transfer operations; theory of crushing; dielectric drying; engineering education.

State Department arranged technical mission to the U.S.S.R., 1957.

Editor, "50th Anniversary Volume, Chemical Engineering Around the World," 350 pages, 1958, American Institute of Chemical Engineers.

Senator HUMPHREY. I think you are to be highly commended. In fact, if we had some kind of a medal available, I think you would deserve it right now, for selecting the kind of people that you are doing.

Senator GRUENING. Well, I want to join in congratulating you on achieving that result, in getting scientists who are familiar with the language of the countries to which they are assigned, because, obviously, unless they can read the scientific publications and take part in scientific meetings, their usefulness would be very much less. And, as you know, the chairman of the subcommittee, Senator Humphrey, is very much interested—in another field—in improving the facility in languages of our Foreign Service officers, which, I think, we all agree is a field in which, by and large, we have been deficient and which we ought to try to improve. The finding of the committee staff on this subject is set forth in Senate Report No. 153, 86th Congress.

We are understandably deficient, because, obviously, there are a great many new countries with languages which are not widely spoken, and for which instruction in the past has not existed in our country. I hope we can pursue that endeavor and staff our Embassies and our

foreign missions with men who are familiar with the languages of the country to which they are sent.

Dr. BRODE. Thank you, Senator Gruening.

Senator GRUENING. I want to say I appreciate your thoughtful and excellent testimony.

Senator HUMPHREY. Before you leave, Dr. Brode, may we again thank you very much and commend you for your fine work. It is very much appreciated by the Congress, and I know by the people.

Dr. BRODE. Thank you.

Senator HUMPHREY. The next witness is Dr. A. Hunter Dupree, department of history, University of California, the author of "Science in the Federal Government: A History of Policies and Activities to 1940."

Dr. Dupree, we welcome you to the subcommittee.

Will you proceed with your statement?

STATEMENT OF DR. A. HUNTER DUPREE

Dr. DUPREE. Thank you, sir. I wish to identify myself as a historian, rather than as a scientist.

In making this statement, I am representing no one save myself, and my only claim on your time and attention stems from the fact that I was giving the problems raised by this bill consideration even before sputnik. I am the author of the book "Science in the Federal Government: A History of Policies and Activities to 1940," Belknap Press of Harvard University Press, 1957, in which I took special pains to trace the successive efforts to establish a central scientific organization in the United States.

I. GENERAL CONSIDERATIONS

My more specific remarks on S. 676 will be based on certain general positions, as follows:

Senator HUMPHREY. By the way, I think I hear Senator Gruening suggesting that we get a copy of this book of yours.

Mr. REYNOLDS. We have a copy in the committee files, Mr. Chairman.

Dr. DUPREE. I have one in my briefcase which I will be glad to make available to the committee.

Senator HUMPHREY. I think it would be helpful.

Senator GRUENING. I would like to suggest, Mr. Chairman, that as a one-time author, the committee should purchase copies and provide one to every member of the subcommittee. I do not think the author should be obligated to furnish these copies.

Senator HUMPHREY. May I suggest as one who only receives books, and not an author, that you are a tough disciplinarian, but undoubtedly just.

Dr. DUPREE. (1) The very names of Department of Science and Technology, and Secretary of Science and Technology suggest a central organization speaking for and acting on science as a whole, not simply on the scientific agencies within the Government and certainly not for a small fraction of them.

(2) The recognition of a need for some sort of central scientific organization has occurred in every generation of our history.

Thoughtful men have felt that science, even while organizing everything else, cannot organize itself effectively.

(3) The recurrent attempts to create a central scientific organization have by their very failures gradually delineated two major characteristics which such an organization must have: (*a*) an ability to represent science as a whole and to have sufficient grasp of the complex interrelations of the various parts of the research enterprise to make intelligent choices among the issues raised by science; and (*b*) a clear relation to the chain of responsibility within the Government so that the organization can make policy and give it the same force as other political decisions.

(4) As a policy area in the Government, science must be compared not with agriculture or commerce but with economics or security. It is a pervasive thing, which had, even by the 1880's, penetrated so many different areas of Government activity that a joint congressional committee found it impossible to define a separate area for a Department of Science.

(5) Science is now administered by a complex array of agencies—in the Government, in the universities, in industry, and in the private foundations. Since World War II these agencies have been welded into a single interdependent unit by a network of grants and contracts. In many of the individual units of this system the administration is given direction by the fact that science is in close conjunction to the problems to be solved. Agricultural research has been effective historically because it has brought to bear science of every sort of its particular problems. Thus the problem implied by a bill to create a central scientific organization has to do not with the administration of individual agencies but with the setting of a general policy for the whole unit.

(6) It is increasingly difficult to leave a general science policy to the chance adjustment of the many administrative units involved. Science is a national resource, and a scarce one. It consists of men and equipment as well as money. Choices as to the use of scarce resources are the policy decisions which most urgently need to be made, and made by those who owe responsibility to none of the individual competing units. At the same time the decisions are rightly and essentially political and should be made by officials responsible under the Constitution to the people as a whole.

II. A DEPARTMENT OF SCIENCE AND TECHNOLOGY AS PROPOSED IN S. 676

In my opinion the Department of Science and Technology proposed in S. 676 would not adequately fulfill the need of the Government and the Nation for a central scientific organization.

(1) The Secretary of Science and Technology would not speak for science as a whole, but only for a few areas—atomic energy, space, basic science as represented by the National Science Foundation, standards, and part of the present Smithsonian functions. He would indeed be competing for appropriations and the use of scarce research manpower with powerful agencies which would merit the name of science as richly as he. He would have direct administrative responsibility for his own area and hence would be bound by his responsibility

to speak in the Cabinet and before the country for his own particular areas primarily.

(2) The question must arise as to whether the agencies listed in the bill represent the ultimate boundaries of the department or whether this group is only a core to which other agencies will be transferred later. It is always possible to pick out a few scientific agencies which have either a tradition of independence or a tradition of instability in their administrative arrangements. But beyond this rather short list one finds agencies equally scientific in their orientation which are deeply enmeshed in the solution of problems in the operating units of the Government. Not only are their places well established by the history of the agency, but their scientific effectiveness depends on their close conjunction with the problems on which they work. No one seems hardy enough to suggest that military research be removed entirely from proximity to the using arms, and few would suggest the transfer of the Agricultural Research Service or the National Institutes of Health. Yet the very existence of the possibility that such transfers might come in the future would throw scientific agencies into conflict. The effort in the 1930's to organize a comprehensive Department of Conservation raised just such a specter for the Forest Service in the Department of Agriculture and led to a clash.

(3) Major reorganizations of the scientific establishment do become advisable from time to time, and a central scientific organization should have as a major responsibility the identification of such areas. But if the Department of Science and Technology were an active competitor for scarce resources it would not perform any coordinating function among the competing units.

(4) The bill itself in section 11(a)(5) reveals the difficulty of making distinctions as to what is properly in the realm of science and what is not. It can be argued that the research programs in the National Museum are just as properly called science as is astrophysics, and that a museum is a tool of research only incidentally different from a telescope. But the crucial thing in the section is that the bill itself shows the need of a decision made on a level above what are essentially two competing units—the old Smithsonian Institution and the new Department of Science and Technology. Significantly, the official chosen by the bill to make this highly technical decision is the Director of the Bureau of the Budget. Not only is he in the Office of the President, but he is in possession of the one tool for the overall allocation of scarce scientific resources which now exists, the budget.

(5) In the absence of any provision in the bill for the continuing development of an overall science policy, those organs already created in the Office of the President would still be required to attempt to grapple with the problems of overall policy.

(6) The proposed Department of Science would include agencies of very different aims. The Atomic Energy Commission and the National Aeronautics and Space Administration have large research programs at several different levels on the scale which runs from basic to applied science. The thing which gives them unity is their concern with a particular set of research problems. The National Science Foundation, on the other hand, is primarily concerned with the support of basic research. Its task is made necessary by the fact that the urgency of applied research in the military and in the Atomic Energy

Commission has claimed a very large share of the scarce scientific resources of the country since World War II. Hence for the Secretary of Science to speak for both types of agency would precipitate serious questions of policy within the Department itself. It also would make the adjustments between the programs of the Foundation and those scientific agencies not included in the Department more difficult.

III. ALTERNATIVES TO A DEPARTMENT OF SCIENCE AND TECHNOLOGY

Unlike some critics of the creation of a department, I feel that the concern implied in the Congress' interest in the problem of overall science policy is justified. The shape of a science policy cannot safely be left to the blind clash of competing agencies both in and out of the Government. My preference for the Office of the President stems not from any overwhelming belief in the benevolence of this particular form of organization. Rather it comes from the fact that science pervades the whole of the governmental structure. Hence coordination can be achieved only at the very highest level of authority. The implementation of such a coordination must emanate not from some irresponsible science czar but from officials with constitutional responsibilities to the people of the United States. The President is the only officer in the administrative branch of the Government with the breadth of authority to cope with the problem. I feel that this is also true in such broad fields as shaping a continuing economic policy to fight a depression. And the presence in the Government structure of the Department of Defense has in no way relieved the necessity for a National Security Council.

Since last summer, when I submitted a statement to this committee, much has been done to fill the need of an overall science policy. The creation of the Federal Council for Science and Technology looks in such a direction. There is a history of difficulty in the principle of agency representation as the base for a council, witness the Division of Government Relations in the National Research Council after the First World War. But the implied permanence of the post of Special Assistant to the President for Science and the continued presence of the Science Advisory Committee offer at least a hope that these three elements will together fuse into something like the central scientific organization which I consider desirable. To recapitulate, I feel that such a central organization for overall science policy should have three main functions:

(1) To develop a science policy for the Government at the highest level, recognizing that what the Government does has important effects on scientific activity outside its walls.

(2) To shape the decisions on the allocation of the scarce scientific resources of the country by a continuous flow of advice to the Bureau of the Budget.

(3) To collect systematically the immense amount of information necessary not only to design present policy but also to anticipate major shifts in the areas of scientific research. This kind of information is distinct from the flow of scientific literature which is now the purview of the Science Information Service. Scientific papers themselves reveal little about science in its social, economic, and governmental set-

ting. It is this setting which the central policy agency must keep in view at all times.

The structure now growing up within the Office of the President should be measured carefully against these basic goals.

Of all the missteps that could be taken in forming a central scientific organization, either in the Office of the President or in a new executive department, the one which would most surely render its comprehensive view of the whole policy field impossible would be to give it direct administrative responsibility for some particular scientific activity. I am thinking here not only of my objections to S. 676, but also of proposals to use the framework of a Department of Science to exploit some area of research not now adequately provided for in the Federal structure. The changing picture of research does indeed require the periodic development of new clusters of agencies around new leading ideas. But in no case is such a necessary readjustment properly deserving of the name of science as a whole. A Department of Science and Technology centered around meteorology or geophysics would not provide central scientific organization for more than a very small sector of the Government's scientific front.

Finally, the role of the Congress in making science policy deserves consideration. In the early part of the 19th century Congress was a distinct deterrent to the development of the Federal research establishment. Late in that century indirect methods of legislating scientific agencies into existence made possible the creation of the basic agencies which today still carry an important part of the Federal responsibility for science. In the 20th century the support which the Congress has given science and the understanding with which it has designed legislation in this field has become increasingly evident. Yet the Congress has been hampered in developing an overall policy by the fact that it has normally considered the needs of science in connection with the particular areas of policy in which the research is serving. Since science must continue to intertwine itself with the problems it seeks to enlighten, this pattern must inevitably continue. But in the area of the dynamics of research as a whole, the Congress as well as the executive must attempt to achieve an overall view. For this reason I feel that standing committees on science and technology would aid immensely in adjusting the total pattern of legislation which affects science. It is as important here as in the executive that the committees be free of immediate concern with particular programs, such as astronautics.

In conclusion, I wish to emphasize the distinction between the administration of science and the setting of overall policy for science. Complete centralization of administration would lead to the ruin of adjustment between science and it uses which has been one of its glorious accomplishments. The setting of a coherent policy for the Government's actions over the whole field of science is urgently needed. It can be achieved in a democracy, and it can be achieved without violating the interests of science itself.

Senator GRUENING. Thank you very much, Dr. Dupree.

I want to congratulate you on a very thoughtful and comprehensive summary of the pros and cons of this problem.

I do want to say that the chairman of this subcommittee, and, I think, the rest of us who have cosponsored this legislation, have no

thought that S. 676 or any other bill now before us is more than a tentative gesture to explore how far we can get. The only way we can get these opinions effectively is to have a bill. It is just like trying to get an opinion from the Supreme Court. You cannot go up and ask for it, but if you have a case in court it ultimately gets there, and then you find out what the Supreme Court thinks on the subject. That is the basis of this proposed legislation.

I think it has been made clear both in your testimony and that of Dr. Brode, and others, that the approach to this question is beset with great difficulties. You refer to the conflict in the thirties between the Department of the Interior and the Department of Agriculture over the transfer of the Forest Service. That was an epic battle, which largely centered around the personality of the then Secretary of the Interior, who was a kind of imperialist in the matter of acquisition of agencies, and wanted that agency, the Forest Service, transferred to his Department of the Interior. And the resistance developed there is a resistance of the kind that we would be bound to encounter, I think, if a Department of Science were set up and attempts were made to move into it from the Departments any of the long-established agencies, of which there are so many doing scientific work.

But I think that the essence of this problem is to try and promote the effectiveness of science in these various agencies, to achieve a better correlation of the various scientific efforts, and to see whether, perhaps, because of the fact that a Department of Science would have an official at Cabinet level, it wouldn't have a little more authority than these various temporary committees and commissions and foundations and boards that are now engaged in various aspects of science. And that, I think, is what we are trying to get at. And you have made some very helpful suggestions as to alternatives.

I believe that we have got to study this problem a good deal further and try to get some kind of a commission that would set out what should go into this department, which agencies—as you point out, that have done very useful work in correlating the research with the actual functioning part of the problem—should be put into such a department, and which should be left where they are. It is quite obvious, it seems to me, for example, that you would not want to disassociate the studies in plant quarantine and economic entomology from the work of the Department of Agriculture. Again, there are fields related to legislation. But I think we are getting closer to an understanding of the problem as a result of this testimony, and your statement has been extremely helpful. I intend to get your book and read it before the next hearing.

The chairman has asked that I state for the record that, although three additional witnesses were scheduled to be heard this afternoon, the legislative situation in the Senate is such that the chairman will be unable to conduct the hearings as scheduled. Therefore, I have been asked to announce that these witnesses—Senator Estes Kefauver, of Tennessee, author of S. 586, which is somewhat similar to the committee bill, S. 676; Dr. Alan T. Waterman, Director of the National Science Foundation; and Mr. William F. Finan, Assistant Director for Management and Organization, Bureau of the Budget—will be heard at a later date to be arranged by the subcommittee when the hearings will be resumed.

The chairman has asked me to insert in the record at this point a communication received from the Honorable T. Keith Glennan, Administrator, National Aeronautics and Space Administration.

(Communication referred to follows:)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
Washington, D.C., April 9, 1959.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Reorganization and International Organizations,
U.S. Senate, Washington, D.C.

DEAR SENATOR HUMPHREY: Your letter of March 27 relative to the scheduling of hearings, April 16–17, to consider S. 676, establishing a Department of Science and Technology, has been received.

I have reviewed the material which you have forwarded, including the report of the Government Operations Committee on a science program. Inasmuch as S. 676 is designed to create a new department of the Federal Government, I do not believe it would be appropriate for me as an administrator of an independent agency to testify on the proposed legislation.

Since I have assumed my present office, I have been continuously engaged in the carrying out of the heavy responsibilities placed on the National Aeronautics and Space Administration in the development of an aeronautics and space program.

In view of the efforts and accomplishments that have been made by NASA in the period since its creation, I would have considerable reservation over a change in its organization structure as is contemplated in S. 676. The National Science Foundation, Atomic Energy Commission, National Aeronautics and Space Administration, and the National Bureau of Standards would all be incorporated in the newly established Department of Science and Technology if S. 676 were enacted into law. The responsibilities, objectives, and programs of these agencies are completely different in character and extent and the institution of one central supervisory authority over these agencies would, in my judgment, hinder the efficient conduct of each.

Sincerely yours,

T. KEITH GLENNAN, *Administrator.*

Senator GRUENING. The committee has also received several letters from other prospective witnesses indicating a desire to be heard on the pending legislation but due to other commitments, or illness, they are not available on the dates set by the committee. These witnesses include:

Dr. Lloyd V. Berkner, president, Associated Universities, Inc., which operates the Brookhaven National Laboratories; Dr. Elmer Hutchisson, director, American Institute of Physics; Dr. Leonard Carmichael, Secretary, Smithsonian Institution; and Dr. Vannevar Bush, former Director of the Office of Scientific Research and Development.

In view of the importance of the testimony that would be available from these outstanding authorities, it will be necessary for the subcommittee to hold further hearings which are scheduled for May 25, 1959, in order to hear witnesses who were scheduled today. These prospective witnesses will be invited to appear at that time.

This subcommittee has concluded this hearing and will recess, until May 25, or subject to the call of the Chair.

(Whereupon, at 11:45 a.m., the subcommittee recessed, to reconvene on the date set by the chairman.)

(The following communications are incorporated into the record at this point, by direction of the chairman of the subcommittee:)

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., April 15, 1959.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Reorganization and International Organizations, U.S. Senate.

DEAR SENATOR HUMPHREY: Please refer to your letter of March 27, 1959, in which you request my views on S. 676, a bill to create a Department of Science and Technology, and to transfer certain agencies and functions to such Department. I regret that I was unable to accept the invitation of your subcommittee to present my views in person, but the following written comments are submitted for your consideration.

The bill would transfer the Atomic Energy Commission and other specified agencies to the proposed Department, where they would continue to exercise their functions subject to the supervision and direction of the Secretary. It would not provide for unified control of all federally supported scientific activities, as a number of key scientific functions (e.g., those performed by the military agencies and the National Institutes of Health) would not be transferred.

With respect to agencies whose research activities are not related to other more fundamental goals, the proposed centralization might be advantageous. However, the Commission is engaged in a number of unique activities which are not carried on by any of the other agencies affected by S. 676 and which would appear to be outside the principal areas of responsibility of a Department established for the purpose of promoting scientific research and training. The Commission is engaged in extensive production and industrial manufacturing activities. Among these are included the production of nearly all of the fissionable material and most of the radioisotopes produced in the United States, and the processing of waste products formed in nuclear reactors. The Commission is responsible for undertaking programs for international cooperation, pursuant to which information and materials are made available to foreign nations. We are also engaged, in cooperation with the Department of Defense, in a number of activities having military significance, including the development of military reactors and the development and manufacturing of atomic weapons. The Commission is responsible for regulating the possession, use, and production of atomic energy for civil or peaceful purposes. Further, the Commission has a positive responsibility to promote the civilian uses of atomic energy. None of these functions have any connection with the primary responsibilities of the proposed Department. In our opinion, placing them under the jurisdiction of the Secretary of Science would be a mistake. For this reason, we recommend against enactment of S. 676.

The Bureau of the Budget has advised us that it has no objection to the submission of this report.

Sincerely yours,

JOHN A. MCCONE, *Chairman.*

JET PROPULSION LABORATORY,
CALIFORNIA INSTITUTE OF TECHNOLOGY,
Pasadena, Calif., April 14, 1959.

Senator HUBERT H. HUMPHREY,
Subcommittee on Reorganization and International Organizations, U.S. Senate, Washington, D.C.

DEAR SENATOR HUMPHREY: I am honored to be asked to present my views on the proposal to form a Department of Science and Technology. However, I do not feel that I can contribute enough to this problem to justify my appearance before your committee this week.

Insofar as I have been able to evaluate this proposal, I have concluded that the Department of Science and Technology is not now in the public interest. I have reached this conclusion for the following reasons:

1. The support of basic science in this country has always come from a variety of sources. This is as it should be and I believe that the centralization of

governmental civilian scientific support in one department will have an unfortunate effect on the development of our reservoir of basic science knowledge.

2. Much of modern science has required very expensive facilities and tools. It seems to me that as the needs have developed the Government has, in fact, stepped in to provide these tools and facilities in appropriate places within the governmental structure, or by the formation of new agencies such as the AEC and NASA.

3. The Federal Council for Science and Technology which has just been formed provides an opportunity for coordination of the scientific activities of the Federal Government. It seems to me that this Council should be given a chance to demonstrate its usefulness before a new Department of Science and Technology is established.

Sincerely,

W. H. PICKERING, *Director.*

INTERNATIONAL BUSINESS MACHINES CORP.,
New York, N.Y., April 15, 1959.

HON. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Reorganization and International Organizations, Committee on Government Operations, U.S. Senate, Washington, D.C.

DEAR SENATOR HUMPHREY: I regret that I cannot accept your kind invitation to present my views before your committee on April 16 and 17, 1959. I feel that it is vitally important to our Nation to have the proper organization within Government in order to best utilize science and technology in formulating policy, and to encourage the growth of science and technology. I am writing to give you my present views and will be most happy to discuss them with you or members of the committee staff at a later date.

There are three discernible areas that characterize the function of science and technology in the Federal Government:

(*a*) The utilization of science and technological information and background to formulate national policy;

(*b*) The utilization of science and technology to perform specific and identifiable Government functions;

(*c*) The support and nurture of science and technology, since the healthy development and growth of science and technology is coupled in a variety of ways with the general welfare and growth of our economy, technology, and culture.

Referring to (*a*) above, it is obvious that the White House, each Cabinet department, independent agency, and congressional committee needs an appropriate number of knowledgable and wise specialists or experts in the formulation of national policy. There are numerous historical and contemporary examples where this specialized knowledge was necessary to set policy. The conditions necessary for the proper use of science and technology in both planning and execution are few in number but most difficult to satisfy. The most basic condition is that the specialist be an accepted member of a policymaking group. Very often policymakers do not recognize that a technical aspect of a problem is the determining element. A specialist thus must be within the inner councils that formulate policy.

Lawyers have always been put in that category. Between the two World Wars the economic specialist was recognized as an important element in policy formulation. Only recently, and only here and there, have we come to appreciate the need for persons with scientific background for this type of activity. Unfortunately, one cannot legislate the inclusion of proper specialists in the councils where policy is formulated. It requires the good judgment and understanding of the person who is responsible for the final formulation of policy. Even if an Assistant Secretary were created in each Cabinet department, or a post of chief scientist or scientific adviser, there is no assurance that he would be utilized properly in this area. This function can only be exercised with a greater and greater appreciation of the role of science in our contemporary world, which in the final analysis is an educational problem.

Regarding (*b*) above, each department utilizes science and technology to perform its functions. Examples that come to mind are the Departments of Defense, Health, Education, and Welfare, and Agriculture. Such departments obviously must have the scientific and technical activities related to their functions within the department. Specialized agencies, independent of Cabinet

departments, have been created to assume certain responsibilities in science and technology that the Congress thought important; examples are the Atomic Energy Commission and the National Aeronautics and Space Agency. Some work is done within Government laboratories, and other work is done by use of Federal funds outside of Government by industry or nonprofit organizations, The problem always arises within a Cabinet department of whether the function of a given Cabinet department has been so modified that certain of its scientific and technical bureaus no longer contribute in a principal way to the mission of that Cabinet department. When that occurs that particular area of science and technology gets very little attention and is underfinanced. Although the function may have profound national interest, it does not receive adequate attention because the area does not serve the current interests of the department; it is just in the wrong place within Government. I would urge very strongly that the committee try to identify such activities.

Regarding independent agencies that have been set up to operate in areas of science and technology, one realizes that when first established by Congress they were so important that it was desirable that they be independent and not submerged within a Cabinet department. There is a feeling that proximity to the President and to the Congress is obtained by setting up an independent agency. This should be reexamined in order to determine whether a more effective operation could perhaps be obtained by the amalgamation or inclusion of some of these independent agencies within a new Cabinet department or an existing Cabinet department, realizing that if this is done one reduces, at least in Washington, the importance of the agency which becomes submerged within a department and which then reports to a Secretary of a department through the complex administrative procedure of Under Secretaries and Assistant Secretaries. And in obtaining a head for such an activity, one runs the risk of not being able to get a person of stature comparable to the head of an independent agency. One then concludes that we must continually reassess the organizational structure of scientific and technological functions, within the departments and outside, to insure that they do not warrant regrouping from time to time. One would hope that this could be developed in your hearings.

With reference to the third function, (*c*), the large utilization of science in this country and by the Federal Government is such that proper growth can only be insured by providing support normally associated with basic research. The National Science Foundation was created for that purpose. Each group that does science and technology must be permitted to have a program in basic research so that it does not lose touch with the new ideas and revolutions that are around the corner in science and technology. Wherever science and technology is performed, it is important that channels are continually available for those groups to be exposed to the best and most forward thinking in the field; that is, they must have roots in basic research and be permitted to operate in that area.

When one looks at the (*b*) and (*c*) functions, one realizes that whatever grouping may evolve—whether, for example, one puts the Science Foundation, the AEC, and NASA in one Cabinet department, or one removes the Bureau of Standards from the Department of Commerce and places it in a new department—it will be necessary to have on the White House level an organization comparable to the Federal Council on Science and Technology, recently created by Executive order to pull together the various interests of science and technology within the Federal Government. For example, oceanography is a technical field of vital concern to many Government agencies. The National Science Foundation is interested because oceans cover a large part of the surface of the earth and an understanding of these water masses is vital to the field of geophysics. The Weather Bureau is concerned with the effect of ocean on weather. The Atomic Energy Commission is interested in the problem of disposing of radiological wastes in the oceans. The Navy obviously is deeply involved in the subject because it is the environment in which it operates. The Department of the Interior requires knowledge of the role of ocean characteristics on the life of various forms of sea life of economic importance. Therefore, there must be within the Federal Government a mechanism to pull these interests together so that they can support each other and provide a coherent Federal program.

A Federal Council for Science and Technology is necessary not only to take a total look at science and technology for the Federal Government comparable, let us say, to the way the Council of Economic Advisers takes a total look at

our economy, but also must provide an operating mechanism for people administering science and technology within Government to get together for a common purpose, such as the example I have cited regarding oceanography.

I hope these ideas will be helpful to you.

Sincerely,

E. R. PIORE, *Director of Research.*

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS,
April 15, 1959.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Reorganization and International Organizations, Committee on Government Operations, U.S. Senate, Washington, D.C.

DEAR SENATOR HUMPHREY: In connection with the scheduled hearings before your subcommittee on the Department of Science and Technology Act of 1959 (S. 676), the National Society of Professional Engineers desires to submit the enclosed statement for the record, setting forth its views and comments on the current study of this important subject.

We appreciate the consideration of you and the other members of the subcommittee, who are also receiving copies of this letter and the statement, and for having our views incorporated into the record.

Very truly yours,

PAUL H. ROBBINS, P.E., *Executive Director.*

STATEMENT OF THE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS ON THE DEPARTMENT OF SCIENCE AND TECHNOLOGY ACT OF 1959 (S. 676)

The National Society of Professional Engineers is a nonprofit, membership organization composed of professional engineers in virtually every branch of engineering practice and type of employment. All of the society's 49,000 members are registered under applicable State engineering registration laws, and are affiliated through 50 State societies and approximately 380 local community chapters. One of the society's primary interests is in presenting the professional engineering viewpoint on matters of national importance, including particularly the consideration by Congress of legislative proposals in which the engineering profession may make a contribution.

For some years we have been following closely the various proposals to create a Department of Science and Technology, and in this connection have studied the various staff reports and other research documents pertinent to the question. The current hearing presents an opportunity to further explore some of the ramifications of the pros and cons of the advisability of creating a Department of Science and Technology, and the subcommittee is to be commended for providing an important forum for this purpose.

In our view, the question of a Cabinet-level Department for Science and Technology involves three primary elements: (1) Coordination of research, both basic and applied; (2) the stimulation of research by the Federal Government; (3) the relative relationship, or prestige, of science and scientists, engineering, and engineers, in the Federal structure.

COORDINATION

It is obvious to all that science, engineering and physical research have become "big business' in the Federal Government. In some respects, it is the biggest business of the Federal Government. As such, it is clear that we should seek every possible means to expand the large sums involved in a manner most calculated to provide the maximum benefits with the least possible duplication of effort. This is true not only in terms of conserving our financial resources, but, of equal importance in the long run, of conserving our technical brainpower and utilizing it at the highest possible level.

Presumably, one of the benefits of a Department such as proposed in S. 676 would be improved coordination of scientific and engineering effort through the office of the Secretary of the Department. The Secretary's authority is implied in the bill's language making the continued operations of the agencies to be transferred "subject to the supervision and direction of the Secretary."

Each of the agencies or functions proposed to be transferred have distinct missions, and it is far from clear at this point that an administrative layer

superimposed on the agencies in the form of a secretariat would result in improved coordination or the lessening of such overlap and duplication as may now prevail. On a preliminary basis, at least, it would appear that the creation of a further agency, and additional high-level positions, should be justified, in part, on a fairly clear showing that the result will be more efficiency through coordination, as well as elimination or reduction of duplicative efforts. We would suggest that further detailed study is required on this important point and that special effort should be undertaken to determine the extent to which a Department of Science and Technology would improve coordination of technological effort, and eliminate or reduce duplication of technological effort.

The newly created Federal Council for Science and Technology may be a more suitable instrument to effect improved coordination and cooperation among the various and diversified Federal agencies having responsibility and operational authority in science and engineering. The Council, while it does not enjoy statutory grounding, nor authority to effectuate organizational or other changes which might be deemed more efficient precedures, does have the advantage of embracing Governmentwide coverage, whereas the proposed Department's authority would be limited to those agencies under its domain. This point is of major importance, in our opinion, because it relates to the predominant role of the defense agencies in the scientific and engineering effort of the Federal Government. None of the legislative proposals, to our knowledge, have suggested that the engineering and scientific efforts of the military departments be transferred to a civilian agency. Obviously, such a proposal, if made, would be highly controversial and of questionable soundness. We do not suggest that the transfer of military engineering and scientific effort to a Department of Science and Technology is desirable; in fact, we would seriously doubt that military defense can be divorced from the technology which today is the heart of our defense system. If this premise be sound, the result of the creation of a Department of Science and Technology, with the ostensible purpose of improving coordination and efficiency, would be an effort to deal with the smaller part of the problem—leaving the larger part of the problem in its present state. The Federal Council, on the other hand, is free to seek improvements by coordination with all aspects of the Federal engineering and scientific activity.

STIMULATION OF ENGINEERING AND SCIENTIFIC ACTIVITY

The subcommittee's report, "Science Program—86th Congress," (S. Rept. No. 120) contains numerous and varied examples of Federal action in recent months designed to stimulate a greater and more effective national scientific and engineering effort. The report of Dr. James R. Killian, Jr., to the 125th national meeting of the American Association for the Advancement of Science, lists many of these activities. The National Society of Professional Engineers was particularly active during the past year in the study of the legislation which emerged as the National Defense Education Act, with particular reference, of course, to the engineering education aspects. Also, we have taken a special interest in the work of the President's Committee on Scientists and Engineers and have participated particularly in the planning and sponsorship of the local and State-level conferences designed to improve the utilization of engineers and scientists.

Some of the other examples range from the NATO Science Committee to the International Geophysical Year. Reviewing all of these recent developments—each having its own particular impact and influence on the growth of technology as a prime force in our Government and our national life—we are impressed by the great diversity and source of activity. This raises the further question whether it is fundamentally sound to look at technology as an entity which can stand by itself as a substantive function. The drive for a Cabinet-level department is based, in part at least, on the supposition that a Department of Science and Technology, on a par with other departments, would be in a stronger position to secure adequate recognition and funds for increased technological activity. The very diversity of the source of that technology suggests, however, that the converse may be true—the recognition of science and engineering, together with adequate financing, may result more from its relative importance in terms of the end product toward which it is directed. We are suggesting that in the public mind and in the mind of the Congress the significant object is space travel, not the scientific effort which makes it possible. In our minds, it open to question whether engineering and science would enjoy greater status and financing if it were placed in the forward position as

the end product. The relative lack of support for basic research, as contrasted with applied research, supports this hypothesis. It is entirely possible that a Department of Science and Technology could unintentionally hinder increased emphasis and support for technological activity by the Government by creating an atmosphere in which technology is regarded as the substance, rather than the servant or "means to the end" of a more readily understandable national objective, e.g., an atomic-powered space vehicle.

Related to the above point is the consideration of those scientific activities and agencies, or parts of agencies, which should be placed in a proposed Department. It has already been indicated that the engineering and science activities of the defense agencies would not be included. What about the engineering and scientific activities which are incidental to, or in support of an agency's primary function? An example in point would be the Bureau of Public Roads. It engages in extended and very important engineering research on the planning, desiging and construction of highways. That work, however, is in support of the Bureau's primary mission of administering Federal and Federal-State programs for the improvement and extension of the Nation's highway system. It would be most inappropriate to deny the Bureau its much-needed engineering research activity and such action would, of course, cripple the agency. It is assumed that there would be no thought of transferring the Bureau to the Department of Science and Technology; else, the Department would quickly become an administrative agency of diverse functional activities. The example, we believe, could be multiplied many times over. It illustrates the extreme difficulty, in our opinion, of separating the engineering and science service from the primary function of the agency involved. On this ground we fail to see the logic, therefore, of selecting some agencies and not others for transfer to the proposed Department. Those most often named for the proposed transfer—National Science Foundation, Atomic Energy Commission, Bureau of Standards, National Aeronautics and Space Administration—likewise have a defined substantive mission, the accomplishment of which requires engineering and scientific effort.

PRESTIGE OF ENGINEERS AND SCIENTISTS

It has been suggested that a Department at the Cabinet level would give engineering and science and engineers and scientists in the Federal structure a voice at the highest policy level. And, it has also been said that coincident with the high place of engineering and science in the Cabinet there would follow improved prestige and status for engineers and scientists. We believe that there is merit in these contentions, and we would fully agree that engineering and science warrant increased recognition, status and position in our relative scale of values—not in the Federal structure alone, but in our entire national complex. As the largest single employer of engineers and scientists, it is particularly incumbent upon the Federal Government to show the way toward an appreciation of engineers and scientists as highly valuable members of the citizenry.

As much as we would applaud and support all moves to raise the level of engineering and science in the Federal structure and the public mind, we would reluctantly conclude that this justification alone is insufficient to warrant the creation of a Department of Science and Technology. If this be the sole justifiable reason for the change, we fear that it might, in fact, rebound to the detriment of the objective and that the final result might be a lessening of public appreciation because of the selfish motivations for the change.

It is suggested, however, that the goal of improved recognition, status and prestige can and should be advanced in other ways pending further study of the wisdom of a Department of Science and Technology. Many steps have been taken toward this objective in the past several years—federally-financed fellowships for graduate study, increased super-grade positions for engineering and scientific personnel, payment of travel expense for interview of potential engineering and science employees in Federal agencies, provision for entry of engineering and science graduates into a higher grade of the civil service structure than is normally allowed, reactivation of the science attaché program, among others.

Undoubtedly, there are many other steps which can be taken along similar lines. We have urged for some years that a most significant congressional action would be a return to the professional classification system. The abandonment of a separate professional schedule in 1949 has proved to be a serious mistake and one which is often mentioned by engineers and scientists in discussing

the desirability of Federal employment. A separate professional schedule would have the further advantage of permitting necessary adjustments in salary levels without requiring an adjustment of the entire general schedule. The "lumping" of professional engineers and scientists in a schedule with clerical, administrative and fiscal employees has caused distortions and inequities by virtue of the need for Federal agencies to compete with private employers for talent in engineering and scientific fields. Because the legislative action we propose is not within the jurisdiction of this subcommittee we do not labor the point with more detail; but we do suggest that a recommendation by the subcommittee along the line suggested would be of great assistance. The National Society of Professional Engineers stands ready at all times to confer with appropriate members of the various congressional committees and their staff members toward the end that the Nation's defense and economic progress shall be furthered to the fullest extent that modern engineering skill and members of the engineering profession can contribute.

SUPPLEMENT

At the conclusion of the above hearings, and at the direction of the subcommittee, the staff prepared a draft bill to conform to the recommendations of witnesses appearing at the hearings, providing for the establishment of a nonpartisan Commission on a Department of Science and Technology, which was filed in the Senate on May 5, 1959, under the joint sponsorship of Senators Humphrey, Capehart, Mundt, Gruening, Muskie, Yarborough, and Keating. The text of this bill, S. 1851, follows:

86th Congress
1st Session

S. 1851

IN THE SENATE OF THE UNITED STATES

MAY 5, 1959

Mr. HUMPHREY (for himself, Mr. CAPEHART, Mr. MUNDT, Mr. GRUENING, Mr. MUSKIE, Mr. YARBOROUGH, and Mr. KEATING) introduced the following bill; which was read twice and referred to the Committee on Government Operations

A BILL

For the establishment of a Commission on a Department of Science and Technology

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

STATEMENT OF PURPOSE

SECTION 1. It is hereby declared to be the purpose of this Act to provide for a full and complete investigation and study in order to determine (1) the desirability of establishing within the executive branch of the Government a Department of Science and Technology in order to provide more effective and better centralized and coordinated science programs and operations within the Federal Government, and (2) if the establishment of such department is desirable, which functions now exercised by other departments or agencies of the Government should be transferred to such department and what, if any, new functions should be given to such department.

ESTABLISHMENT OF THE COMMISSION ON A DEPARTMENT OF SCIENCE AND TECHNOLOGY

SEC. 2. (a) In order to carry out the purpose of this Act, there is hereby established a commission to be known as the Commission on a Department of Science and Technology (in this Act referred to as the "Commission").

(b) Service of an individual as a member of the Commission or employment of an individual by the Commission as an attorney or expert in any business or professional field, on a part-time or full-time basis, with or without compensation, shall not be considered as service or employment bringing such individual within the provisions of sections 281, 283, 284, 434, or 1914 of title 18 of the United States Code, or section 190 of the Revised Statutes (5 U.S.C. 99).

MEMBERSHIP OF THE COMMISSION

SEC. 3. (a) NUMBER AND APPOINTMENT.—The Commission shall be composed of sixteen members as follows:

(1) Eight appointed by the President of the United States, four from the executive branch of the Government who are participating in Federal scientific activities, and four from private life who are eminent in one or more fields of science;

(2) Four appointed by the President of the Senate, two from the Senate and two from private life who are eminent in one or more fields of science; and

(3) Four appointed by the Speaker of the House of Representatives, two from the House of Representatives and two from private life who are eminent in one or more fields of science.

(b) POLITICAL AFFILIATION.—Of the members appointed by the President, not more than four members shall be from each of the two major political parties, and of each class of two members appointed under clauses (2) and (3) of subsection (a), not more than one member shall be from each such party.

(c) VACANCIES.—Any vacancy in the Commission shall not affect its powers, but shall be filled in the same manner in which the original appointment was made.

ORGANIZATION OF THE COMMISSION

SEC. 4. The Commission shall elect a Chairman and a Vice Chairman from among its members.

QUORUM

SEC. 5. Nine members of the Commission shall constitute a quorum.

COMPENSATION OF MEMBERS OF THE COMMISSION

SEC. 6. (a) MEMBERS OF CONGRESS.—Members of Congress who are members of the Commission shall serve without compensation in addition to that received for their services as Members of Congress; but they shall be reimbursed for travel, subsistence and other necessary expenses incurred by them in the performance of the duties vested in the Commission.

(b) MEMBERS FROM THE EXECUTIVE BRANCH.—The members of the Commission who are in the executive branch of the Government shall serve without compensation in addition to that received for their services in the executive branch, but they shall be reimbursed for travel, subsistence, and other necessary expenses incurred by them in the performance of the duties vested in the Commission.

(c) MEMBERS FROM PRIVATE LIFE.—The members from private life shall each receive $100 per diem when engaged in the actual performance of duties vested in the Commission, plus reimbursement for travel, subsistence, and other necessary expenses incurred by them in the performance of such duties.

STAFF OF THE COMMISSION

SEC. 7. (a) The Commission shall have power to appoint and fix the compensation of such personnel as it deems advisable, in accordance with the provisions of the civil-service laws and the Classification Act of 1949, as amended.

(b) The Commission may procure, without regard to the civil service laws and the classification laws, temporary and intermittent services to the same extent as is authorized for the departments by section 15 of the Act of August 2, 1946 (60 Stat. 810), but at rates not to exceed $50 per diem for individuals.

SCIENCE ADVISORY PANEL

SEC. 8. (a) The Commission shall establish an advisory panel of not less than one hundred competent and experienced members of the scientific community of the United States to serve on request as scientific consultants to the Commission or to individual members of the Commission while performing the duties of the Commission.

(b) Members of such panel shall be chosen from Government officers and employees and from individuals in private life on the basis of competence, experience, integrity, availability, and ability to communicate not only to professional scientists but to laymen.

(c) Any member of such panel who is a Government officer or employee shall receive no compensation for his services as such a member, but shall be reimbursed for travel, subsistence, and other necessary expenses incurred in the performance of his duties as such a member.

DUTIES OF THE COMMISSION

SEC. 9. (a) INVESTIGATION.—The Commission shall carry out the purpose of this Act as described in section 1.

(b) REPORT.—The Commission shall submit interim reports to the President and the Congress at such time, or times, as the Commission deems advisable, and shall submit its final report to the President and the Congress not later than May 31, 1960. The final report of the Commission shall propose such legislation and administrative actions as in its judgement are necessary to carry out its recommendations.

POWERS OF THE COMMISSION

SEC. 10. (a) HEARINGS AND SESSIONS.—The Commission, or any member thereof, may, for the purpose of carrying out the provisions of this Act, hold such hearings and sit and act at such times and places, and take such testimony, as the Commission or such member may deem advisable. Any member of the Commission may administer oaths or affirmations to witnesses appearing before the Commission or before such member.

(b) OBTAINING OFFICIAL DATA.—The Commission is authorized to secure directly from any executive department, bureau, agency, board, commission, office, independent establishment, or instrumentality information, suggestions, estimates, and statistics for the purpose of this Act; and each such department, bureau, agency, board, commission, office, establishment, or instrumentality is authorized and directed to furnish such information, suggestions, estimates, and statistics directly to the Commission, upon request made by the Chairman or Vice Chairman.

EXPENSES OF THE COMMISSION

SEC. 11. There are hereby authorized to be appropriated such amounts as may be necessary to carry out the provisions of this Act.

TERMINATION OF COMMISSION

SEC. 12. The Commission shall cease to exist thiry days after submitting its last report as required under section 9.

The Chairman of the subcommittee made the following explanatory statement of the provisions of S. 1851 on the floor of the Senate on May 5, 1959:

STATEMENT OF SENATOR HUBERT H. HUMPHREY, CHAIRMAN, SUBCOMMITTEE ON REORGANIZATION AND INTERNATIONAL ORGANIZATIONS, COMMITTEE ON GOVERNMENT OPERATIONS

Mr. President, on behalf of myself, and Senators Capehart, Mundt, Gruening, Muskie, Yarborough, and Keating, I submit for appropriate reference, a bill providing for the establishment of a Commission on a Department of Science and Technology.

This bill has been drafted under my direction by the staff of the Committee on Government Operations to conform to recommendations made to the Subcommittee on Reorganization and International Organizations at its recent hearings on the bill, S. 676, to create a Department of Science and Technology and to transfer certain agencies and functions to such department. The president and the vice president of the Engineers Joint Council and the executive secretary of the American Chemical Society recommended to the committee that there was an urgent need for the appointment of a commission patterned along the lines of the Hoover Commissions to conduct a

study as to whether or not a Department of Science should be created, and, if such a department was found to be desirable, that the proposed commission should recommend to the President and to the Congress which functions now being performed by other departments and agencies of the Government should be transferred to such department.

It was suggested that the Commission should be composed of eminent authorities in the field of science and who are recognized leaders of the scientific community, representatives of the Federal Government agencies which were engaged in basic civilian science activities, and of members of the legislative branch of the Government.

Practically every witness who testified at the first 2 days of hearings on S. 676 were in agreement that, in order to insure the establishment of a workable and acceptable program for the proper coordination of Federal science activities, drastic reorganizations in existing Federal agencies dealing with science, technology, or engineering would be required. Some of the witnesses supported the objectives of S. 676, and others expressed opposition to the creation of a Department of Science and Technology, primarily because there was general disagreement as to what agencies of the Federal Government should be incorporated in the proposed new department or in any agency that may be established for the centralization of such activities.

In testifying before the subcommittee, in opposition to S. 676 as drafted by the staff of the Committee on Government Operations, the Secretary of Commerce, Lewis L. Strauss, in reply to a question which I directed to him as to his views on the proposal to create "an impartial commission along the lines of the Hoover Commission formula," stated:

"I think it would be an excellent idea * * * I would say that such a survey * * * would be a very salutary thing."

In supporting the bill, Dr. Wallace Brode, chairman of the board and past president of the American Association for the Advancement of Science, and now the science adviser to the Secretary of State, stated that—

"Two major decisions are required, one as to whether a Department of Science should be formed and, second, as to the composition of such a Department. A Commission of governmental and nongovernmental experts in science and nonscience areas, similar to a 'Hoover Commission' type, might consider these problems, and especially the second phase; if a Department of Science is inevitable, just what activities of the Government should be included."

The bill I am submitting at this time would establish such a commission. Its authority would provide that the Commission would conduct two basic studies, (1) the desirability of establishing a Department of Science and Technology, and (2) what functions should be transferred to such department if established, and to submit its report and recommendations to the President and the Congress not later than May 31, 1960.

In drafting the bill the subcommittee gave consideration to extending the authority of the proposed Commission to include specific requirements, in the declaration of policy and in the section dealing with the duties of the Commission, that the Commission should also study and report on problems relating to (*a*) the need for strengthening American science and technology as one of our essential resources for

national security and welfare; (*b*) the promotion of better centralization and coordination of Federal science programs and operations through necessary and desirable reorganizations of existing departments and agencies which relate directly to Federal science and research; and (*c*) to formulate effective policies for training, recruiting, and utilization of scientific and engineering manpower.

There are other areas of great importance to the Federal science program, such as meteorology, oceanography, and other centralized research areas, which are not specifically outlined in the bill for specialized studies. For instance, oceanography certainly should come within the purview of the studies to be conducted by the Commission if a complete review is to be made of all Federal science activities. The importance of this program is set forth in the subcommittee's report to the Senate (S. Rept. 120, 86th Cong., pp. 51–57), which includes the text of a report submitted by the Subcommittee on Oceanography of the National Academy of Sciences—National Research Council. Also Dr. L. B. Berkner, president, Associated Universities, Inc., in recommending the creation of a Department of Science, proposed specifically that a division or bureau of oceanography should be incorporated within such department.

While these directives are not specifically spelled out in the bill as introduced, it is the view of the subcommittee that studies would of necessity be made into these areas of Federal science activities since this type of information would be essential to members of the Commission before a report and recommendations could be made to the President and the Congress.

Section 3, relating to the membership of the Commission, deviates from the composition of the Hoover Commissions in that it would provide for the appointment of 16 members (8 by the President and 4 each by the Senate and House of Representatives), whereas each of the Hoover Commissions consisted of 12 members (4 by the President and 4 each by the Senate and House of Representatives).

The objective in recommending the increased number of members to be appointed by the President is, primarily (1) to give recognition to the desirability of having the President initiate any program calling for the creation of a Department of Science and Technology, and (2) to permit the President to designate at least four members from the executive branch who are responsible for the operations of major Federal science programs (for instance, the Special Assistant to the President and head of the Council on Science and Technology, and the heads of Atomic Energy Commission, the National Aeronautics and Space Administration, and the National Science Foundation, may wish to be represented), and to permit him to appoint four members who are outstanding in the scientific community, in addition to four eminent scientists who would be appointed by the legislative branch. This authority for appointment of not less than 16 members, 8 of whom would represent the scientific community, would permit a wider selection of qualified representatives of the sciences involved. It is the view of the subcommittee that, before any Department of Science is created, the scientists themselves should actively participate in the development of any program that may be recommended by the proposed Commission.

In addition to granting authority to the Commission to employ such technical personnel as may be required (sec. 7), the bill would author-

ize the Commission to establish a Science Advisory Panel of not less than 100 competent and experienced members of the scientific community of the United States to serve on request as scientific consultants to the Commission or to individual members.

Mr. President, further hearings on S. 676 will be necessary in order that the subcommittee may have the benefit of the views of several witnesses who could not be heard on April 16 and 17, when the first hearings were held. It is proposed that these hearings will be resumed on May 25, and witnesses invited to testify at that time will also be requested to give the subcommittee their views and recommendations on S. 1851.

[From Missiles and Rockets, Apr. 27, 1959]

EDITORIAL

(By Erica M. Karr)

DEPARTMENT OF SCIENCE: STILL "IFFY"

HOOVER-TYPE COMMISSION RECOMMENDED IN CONGRESSIONAL HEARINGS TO DECIDE HOW TO CENTRALIZE SCATTERED EFFORTS IN SCIENCE

The Senate Government Operations Committee has wound up the first of two sets of hearings on the question: Should the United States establish a Department of Science? Consensus of most witnesses during the 2-day hearings was that something should be done to coordinate the labyrinth of Government's scientific efforts starting with a Hoover-type commission to decide what, when, and how much.

Most of those favoring a super science agency also suggested that a committee of experts—to include scientists from Government and industry—recommend exactly which U.S. scientific functions should be blanketed under the Department.

The bill setting up such a Federal agency, to be headed by a Secretary of Science, was introduced jointly by Senators Hubert H. Humphrey, Democrat, of Minnesota, and John L. McClellan, Democrat, of Arkansas.

The measure would coordinate and centralize under one administrative head, civilian science functions now scattered in various agencies. A similar, though less sweeping measure, has been introduced by Senator Estes Kefauver, Democrat, of Tennessee.

Although the Science Department proposal got short congressional shrift last year, supporters feel the move is inevitable eventually. Said one: "It's coming. It might not be this year, but you can bet your life on it: The United States will have a Department of Science before too long."

How it would work.—The Humphrey bill would put under one administrative roof the following: The Atomic Energy Commission, the National Aeronautics and Space Administration, the National Science Foundation, the Bureau of Standards, and research functions of the Smithsonian Institution.

All strictly military agencies, such as ARPA, would stay in the Defense Department although there would be liaison with the new civilian Department. The status of such Executive Office groups as the Science Advisory Committee would be left to the discretion of the President.

The Commerce Department's Office of Technical Services would be transferred to the Department to (1) develop a comprehensive science information program; (2) act as a central clearing house for foreign scientific literature; (3) collate, abstract, translate, and disseminate domestic and foreign scientific information; (4) consolidate and coordinate scientific functions of other agencies with the Department; (5) supplement and support civilian sources of scientific information.

Congressional groups.—In addition to streamlining the Government scientific structure, Congress would remodel its own house. The Humphrey bill also calls for a super science committee on each side of Congress to cover astronautics, basic and applied science, atomic energy, and the new Department of Science, with subcommittees for each specific area.

More research.—The bill would establish National Institutes of Scientific Research in answer to the "urgent need for a greatly expanded program of scientific research in the United States."

The advantages to industry of a civilian scientific super agency are obvious. There would be one central source for scientific information, letting of contracts and decisionmaking. One agency would not be able to tie up funds for the project of another agency and leave the contractor caught in the middle, as has happened in the past.

Scientific opposition.—Despite the clear benefits to science, some scientists strongly oppose the Science Department idea on two grounds: they fear they would be dictated to by "politicians"—told what was wanted and how to do it—and that a new department, no matter what its scope, would come out on the short end of things moneywise.

Supporters of the new measure say that a Secretary of Science would be one political appointee who could go to bat for scientists more effectively. As for money, it is pointed out Congress has never been so science-minded and—if it follows in its own footsteps of last year—it will try to add to rather than subtract from budget requests.

Other questions.—Some of the problems to be considered in creation of a Science Department in addition to which scientific functions now within existing agencies should be blanketed are:

What degree of control or coordination should the new agency exercise in the scientific work of other departments or agencies?

Should it be a purely civilian agency or should it also take on civilian research on military projects?

Administration foes—Although Science Department boosters are riding high on the tide of the times, there is some strong administration opposition. The new Federal Council for Science and Technology created by Presidential order on March 13 was seen as an attempt by Science Adviser Dr. James R. Killian to stall creation of such a department.

Further, it is pointed out, a good argument can be made that the new scientific organizations have not yet had a chance to prove themselves.

Although there is always resistance to creating another Government agency, it is not expected to be strong in this case. Whether enough support can be garnered to push a measure through this year will depend to a large extent on the public support it gets.

One encouraging sign to Science Department pushers: One of the Humphrey bill's four cosponsors is the junior Senator from Texas, Ralph W. Yarborough. Said one legislative expert: "Yarborough is hardly likely to put his name to a measure that he wasn't sure would have the support of Lyndon Johnson (Senate leader from Texas), and if it's got that, it's in."

"In" in the Senate would still leave a few hurdles.

Sam Rayburn, Speaker of the House, will not commit himself "until I have a chance to study the bill." And biggest question mark of all would be the President, who despite strong opposition from some in his Cabinet, has not yet made his own views known.

[From the Saturday Review, May 2, 1959]

EDITORIAL

(By John Lear, science editor)

Should there be a Secretary of Science in the Cabinet of the President of the United States?

When Saturday Review Research raised that question publicly, for the first time in a general magazine of national circulation, in February 1957, a storm of protest rose from the scientific world. Visions of dictatorship were seen. The ruin of free research was feared. Saturday Review's proposal hadn't been dogmatic. A willingness to accept almost any gesture of coordination at the White House level was expressed. But the furor continued for some time.

Then, in the autumn of that year, the Russians launched the first man-made satellite of earth. A Special Assistant to the President for Science and Technology was appointed almost overnight. The appointee, Dr. James R. Killian, Jr., revitalized the existing Science Advisory Council. More recently, he asked and obtained the establishment of a Federal Council for Science and Technology

to bring together regularly policy level spokesmen for the National Science Foundation, the Atomic Energy Commission, the National Aeronautics and Space Administration, and the Federal Departments of Agriculture, Commerce, Interior, and Health, Education, and Welfare. For the first time in the history of the Government, bureaucrats today are being required ot think of science in terms of its overall impact. And talk of a Secretary of Science is no longer frightening. It is now merely controversial, along with almost everything else in science.

In mid-April, the Subcommittee on Reorganization of the U.S. Senate Committee on Government Operations put the controversy on public view, in 2 days of formal hearings. The scientific community was still generally opposed to a Department of Science that would embrace all science activities of the Government. Most scientists were convinced that it would be impossible, even if desirable, to separate from the different departments the science functions that supported daily operations. There was also agreement on two other previously disputed points: (1) the National Science Foundation should continue as it is, a simple grant-giving agency, and should not be expected to fulfill its original assignment of creating policy, and (2) policy questions should remain centered in Assistant to the President Killian's office at the White House.

Surprising support developed for a plan that Lloyd Berkner, a member of Dr. Killian's Science Advisory Committee, had been repeatedly offering for 6 months. It calls for a new Department of Science and Technology with the following 10 divisions:

Physical sciences and standards.
Oceanography.
Meteorology and climatology.
Continental structure and resources.
Scientific and technical information.
Government map service.
Time, geodesy, and astronomy.
Continental fish and wildlife.
Radio and outer atmosphere.
Polar activities.

"A real division of oceanography could look to the establishment of a sound oceangraphic program operating 20 or 30 ships," Berkner has pointed out. "Such a program could be developed in close juxtaposition to universities and research institutions so that the expert knowledge of our whole academic community could be brought to bear on the entire range of oceanographic problems. It should include the oceangoing and mapmaking functions of the Coast and Geodetic Survey and of the Hydrographic Office, but in addition it must include operations, expeditions, and scientific studies on a scale commensurate with the whole scientific job on the coasts, in the oceans, and under the oceans, which we are now unable to accomplish. Marine resources and marine biology would certainly form an important aspect of its work.

"The division of meteorology and climatology should embrace not only the present forecasting and weather services, but also responsibility for surface and ground water surveys of the Geological Survey, evaporation studies, snow, ice, glaciology, and permafrost, and indeed the whole responsibility for water resources; we cannot forget that water is now our most valuable mineral. Certainly, a major emphasis of the Division would be a real research problem looking to full light of knowledge on precise short-range, seasonal, and long-range forecasting, and the potentialities of weather control."

Among the supporters of Berkner's scheme is Dr. Dael Wolfle, executive officer of the American Association for the Advancement of Science. Dr. Wolfle indicated his position—a significant one in view of the flat opposition to a Department of Science voted at the 1958 Parliament of Science sponsored by the AAAS—in an early April lecture at the University of Nebraska.

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